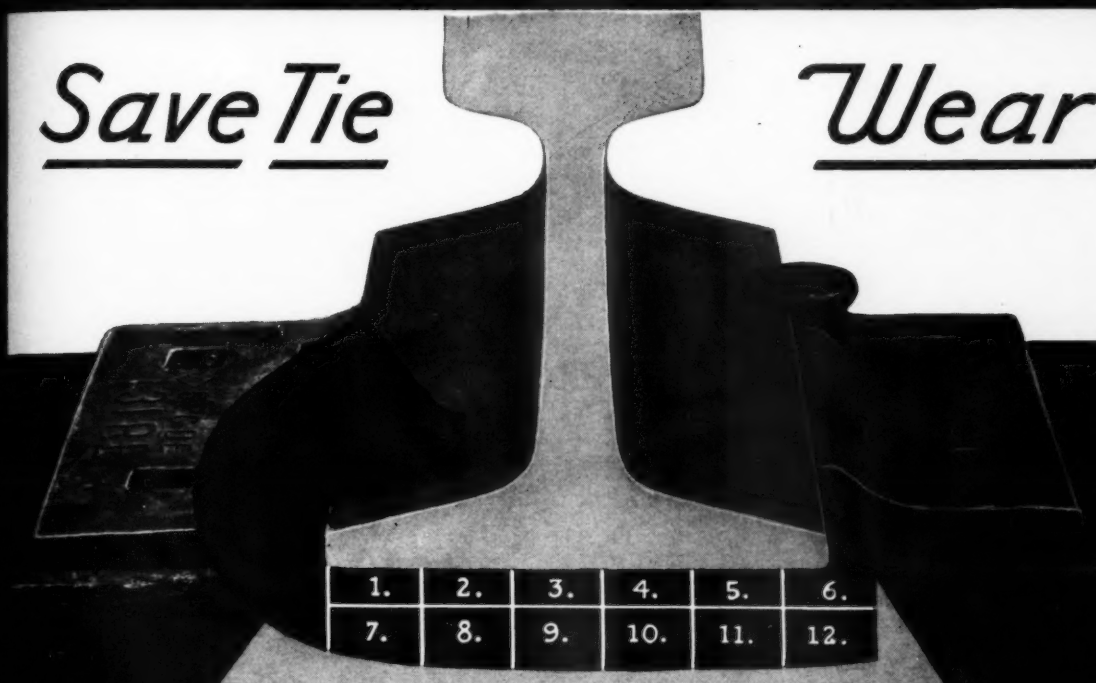
Save Tie Wear



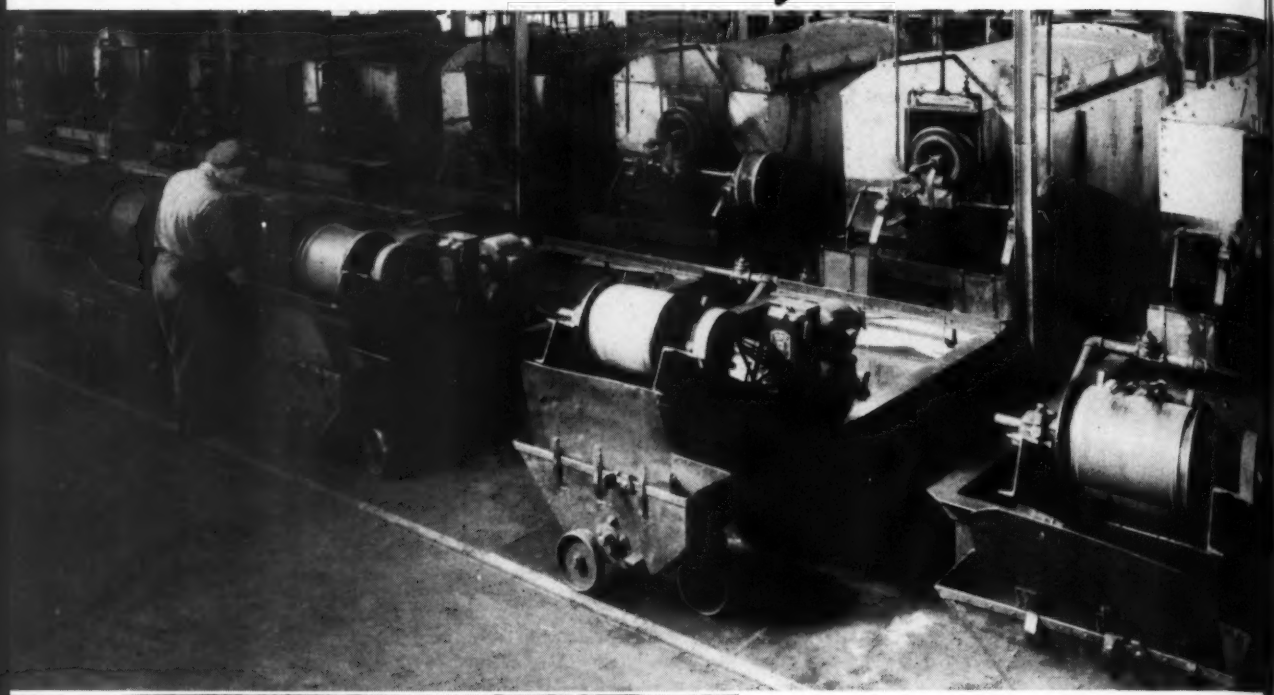
with the IMPROVED FAIR!

THE P. & M. CO.

CHICAGO • NEW YORK • DENVER • CLEVELAND • ST. LOUIS • WASHINGTON • SAN FRANCISCO • ST. PAUL • BOSTON

Reliance **HY-CROME** *Spring Washers*

PUTTING THE *Spring* IN HY-CROME

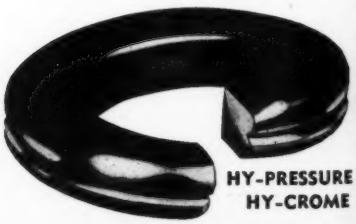


• Close control of heat treating methods is the reason for Hy-Crome's excellent spring qualities.

• Spring Washers, having been formed from steel with the proper annealed structure, are maintained at the correct temperature in cycle controlled hardening furnaces and are fast quenched in temperature controlled oil tanks of unusually large capacity—automatic conveyors carry Hy-Crome Spring Washers from hardening furnace and oil quench to tote pans as shown above.

• Drawing to proper temperature after hardening in instrument controlled furnaces, shown at left, to relieve stress in the structure and put the **SPRING** in Hy-Crome Spring Washers completes the heat treating operation. Experienced personnel under the supervision of our Metallurgical Department control the heat treating operation. An opportunity to discuss Hy-Crome Spring Washers with you and arrange a test will be appreciated.

"Edgemark of Quality"



HY-PRESSURE HY-CROME

EATON MANUFACTURING CO. RELIANCE SPRING WASHER DIVISION, MASSILLON, OHIO

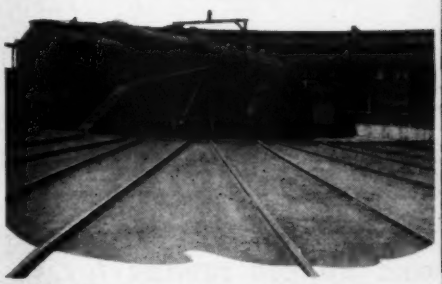
Sales Offices: New York • Cleveland • Detroit • Chicago • St. Louis • San Francisco • Montreal

TIME FLIES!

26 YEARS AGO NO-OX-ID STARTED TO WORK ON THE RAILROADS

The name NO-OX-ID was trademarked in 1918. When the war broke out it was among the first rust preventives in military service. Because of that, NO-OX-ID for home defense against rust has not always been available. May we suggest that you check your supply and get your order in line for early shipment.

DEARBORN CHEMICAL COMPANY
Dept. U, 310 S. Michigan Avenue
Chicago 4, Illinois



NO-OX-ID protects turntables, track scales, piping, and conduit against rust. Lasting protection at low cost.

Signal bridges and overhead cranes are perfectly protected with NO-OX-ID.

Water storage tanks and stand pipes last longer when protected with NO-OX-ID.

NO-OX-ID not only prevents rust and freezing of rail joints, but is also acts as a lubricant. Also used to protect circuit control rods and battery boxes.

NO-OX-ID applied to bridges stops loss of steel, thus maintaining original strength.

Published monthly by Simmons-Boardman Publishing Corporation, 105 W. Adams St., Chicago 3, Ill. Subscription price: United States and Possessions, and Canada, $3.00; Foreign, $3.00. Single copies 35 cents. Entered as second-class matter January 20, 1933, at the postoffice at Chicago, Ill., under the act of March 3, 1879, with additional entry at Mount Morris, Ill., postoffice. Address communications to 105 W. Adams St., Chicago 3, Ill.

TIGHT TRACK BOLTS DO AN ESSENTIAL WAR TIME JOB

Verona *Fixed Tension* Triflex Spring

Provides definite and simple means for establishing uniform tension in all track bolts. Exceeds A.R.E.A. requirements for reactive spring pressure 2½ times.

Write today for complete information

SINCE 1873

WOODINGS-VERONA TOOL WORKS, VERONA, PA.

SINCE 1873

The kind of implements you will need always!!!

While the trend is toward mechanized equipment, the war has proved that good heavy hand tools are indispensable.

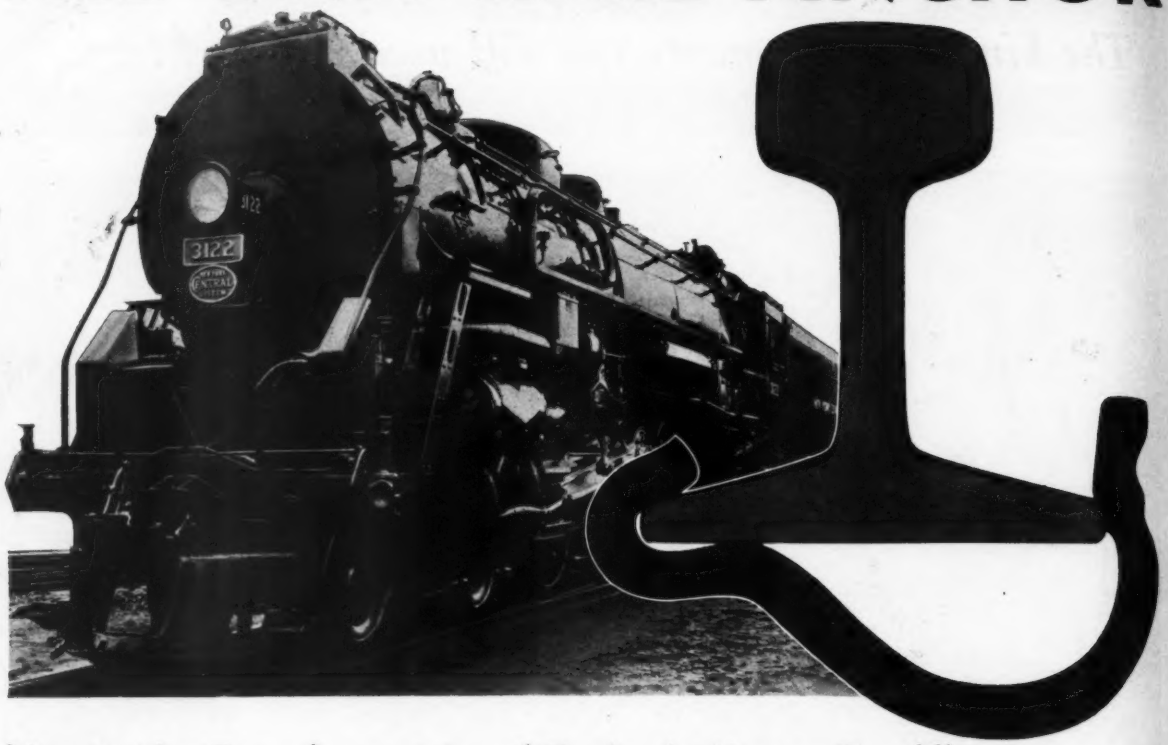
Warren Tool Corporation manufactures the famous Flex-Toe Claw Bar and the Devil Line of chisels, mauls, and sledges, made from electric furnace alloy tool steels.

Under war conditions, we continue our production of quality tools . . . after the war we plan to make them even better.

WARREN TOOL CORP.
WARREN, OHIO

★
★
★

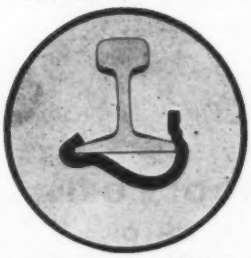
THE UNIT RAIL ANCHOR



Meets the Requirements of Today's Heavy Traffic

1. Anchor is quickly forced into position by pressing down on tool handle

2. Anchor in top notch position grips new rail tightly



3. In lower notch position grips undersized rail tightly

4. To remove Anchor, tool is applied to upstanding end of Anchor and pressed downward

BETTER THAN EVER

—made of high carbon, round edge, high manganese steel, specially heat treated in automatically-controlled homo electric furnaces.

—easy to apply and easy to remove, without diminishing its holding power. No injurious hammering or overdriving.

—adapted for two sections of rail, old or new—an exclusive feature.

—a sufficient number of tools (combination lining bar and application tool) are furnished free with each shipment.

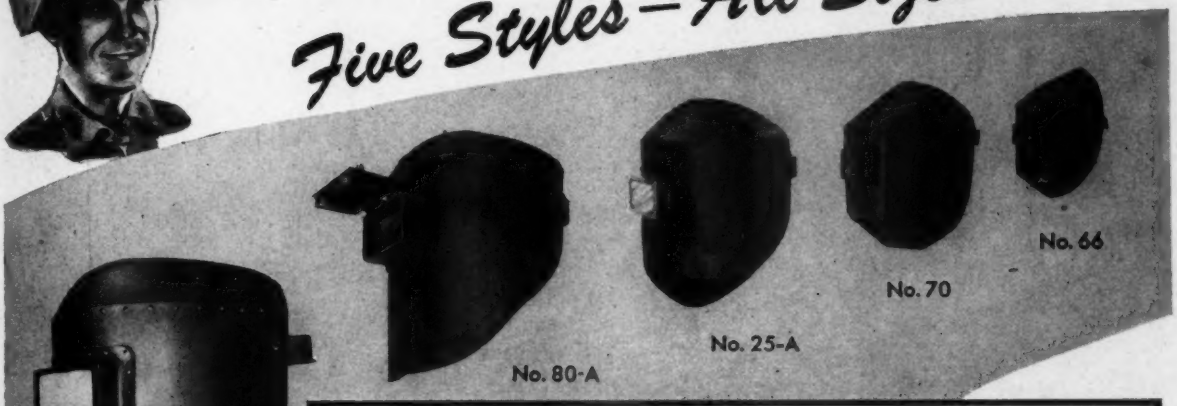
New York Office
3712 Woolworth Bldg.
233 Broadway
New York (7), N. Y.

UNIT RAIL ANCHOR COMPANY, INC.
Subsidiary of Hubbard & Co. — Tool Division
Manufacturers of Quality Railroad Track Tools and Alloy Spring Washers per AREA Specifications
6301 Butler Street
Pittsburgh (1), Pennsylvania

Chicago Office
Room 924
332 S. Michigan Ave.
Chicago (4), Ill.

POPULAR WELDING HELMETS

Five Styles—All Sizes



These quality arc welding helmets afford a wide range of selection to meet individual preferences, as follows:

No. 45-A: Strong and leakproof, weighing only 15 oz without lens. Made of best grade, non-warping, black vulcanized fibre. Adjustable chin rest, free-floating wide range headgear

No. 80-A LIFT-FRONT HELMET: Same as No. 45-A, except that it has a lift-front glass holder. Operator may observe work without lifting helmet. Space is provided for extra clear glass. Weight, about 21 oz. without lens.

No. 25-A: Compact, form fitting, and well ventilated. Especially designed for close-quarter use. Made of best grade, non-warping, black vulcanized fibre. Adjustable chin rest, free floating wide range headgear. Weight, 16 oz. without lens.

No. 70: A lower-priced helmet that is serviceable, well-made, and leakproof Made of good quality, non-warping, black vulcanized fibre. Adjustable headgear and chin rest. Weight, 14 oz. without lens.

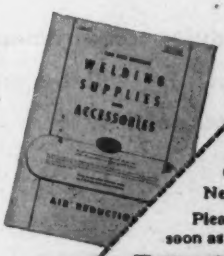
No. 66: A moderately priced, leakproof helmet. Leather sweatband, sliding type adjustable headgear. Streamlined design makes it ideal in close quarters. Weight, about 19 oz. without lens.

Save Buying Time

use AIRCO'S illustrated price list of gas and arc welding supplies

This handy booklet gives prices, sizes and shipping details on Airco's comprehensive line of gas and arc welding accessories. Mail the coupon for your free copy. If you also want facts on Airco Electrodes, indicate request on the coupon.

★ BUY UNITED STATES WAR BONDS ★



REM

Air Reduction Sales Co.
60 E. 42nd St.,
New York 17, N.Y.

Please forward as soon as possible:

☐ Airco Gas and Electric Supplies Price List.
☐ Airco Electrode Price List.

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Company.....
Address.....
City..... State.....

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General Offices: 60 East 42nd Street, New York 17, N. Y.
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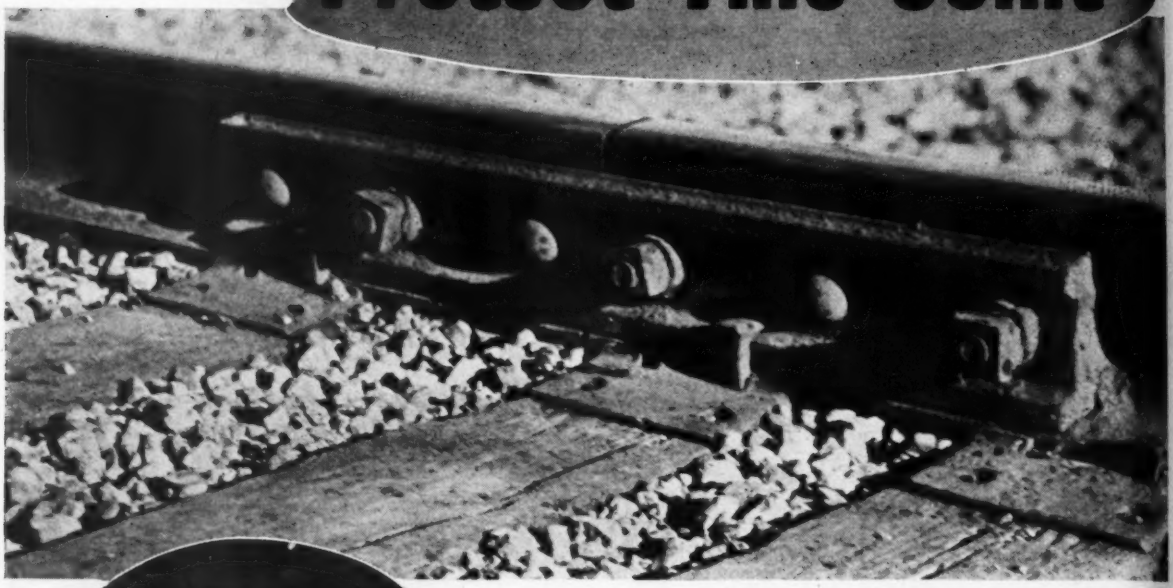
Protect This Joint

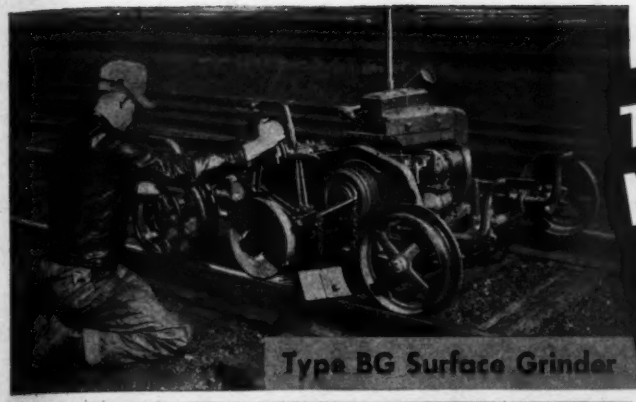


Schedule requirements so that Packing will be on hand when you need it.

Against Corrosion

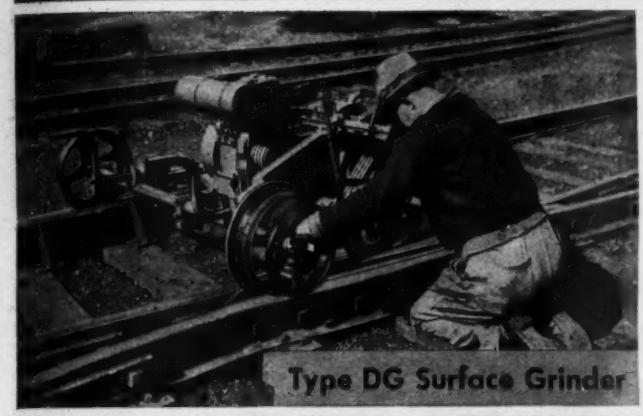
It is just as important to protect joints on light traffic track where rail must last many years with a minimum of maintenance as on heavy tonnage trunk line.

RAILWAY MAINTENANCE CORP.
PITTSBURGH 30, PENNSYLVANIA

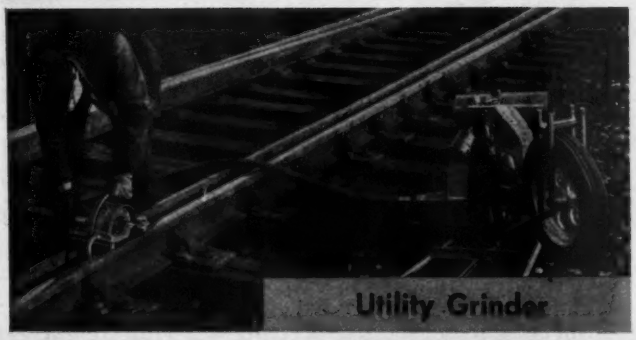


Type BG Surface Grinder

There is a type of NORDBERG GRINDER best adapted to your grinding jobs



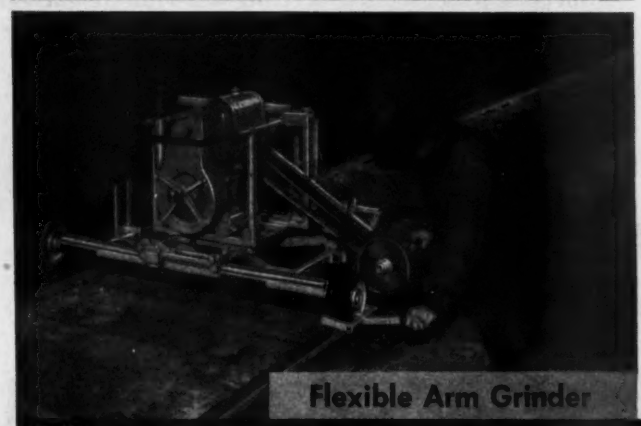
Type DG Surface Grinder



Utility Grinder

These five grinders were developed to meet your requirements wherever grinding is done in the maintenance of track. By the addition of the flexible shaft utility and the use of special Nordberg grinding accessories, these grinders are adaptable to a variety of grinding operations. You can do these jobs in less time, at lower cost and obtain a better quality of work when Nordberg Grinders are used.

- **Removing flow at switchpoints and stock rails.**
- **Undercutting stock rail to house switchpoint.**
- **Grinding out corrugations and wheel burns.**
- **Grinding rail ends built up by welding.**
- **Removing humps from hardened rail ends.**
- **Grinding flangeways and frogs.**
- **Removing mill tolerance.**
- **Leveling cropped rail.**
- **Rail end slotting.**



Flexible Arm Grinder

Midget Grinder

NORDBERG MACHINERY

NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

Safeguard High-Priority Rolling Stock

with FLINTKOTE CAR CEMENTS

Railroads from coast to coast are protecting war-vital freight cars and locomotives with Flintkote Car Cements. In spray and trowel consistencies, these asphalt cements meet the most exacting railroad specifications for new equipment and car maintenance.

FLINTKOTE RAILROAD PRODUCTS

Asphalt Emulsions • Asphalt Protective Coatings • Building Materials
Car Cements • Cold Mastic Flooring • Stock Car Flooring
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American MATERIALS HANDLING FOR EVERY INDUSTRY

IN THE RAILROADS' YARDS *and* STORE DEPARTMENT

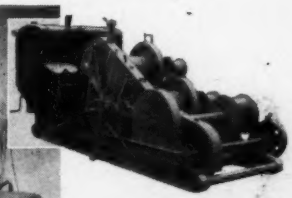
Here are two pictures that illustrate the versatility of the AMERICAN Locomotive Crane as a materials handling method for railroads' store departments. Take magnet or hook. This locomotive crane pushes the cars to a stock pile, picks up and places in the car whatever quantity is required, on to other piles and then back out of the yard. The same is true when equipped with a bucket.

And these late model AMERICAN Locomotive Cranes have design and construction features that, in reach, lifting capacity, speed and ease of handling, and movability, make the use of old equipment costly and wasteful by comparison.

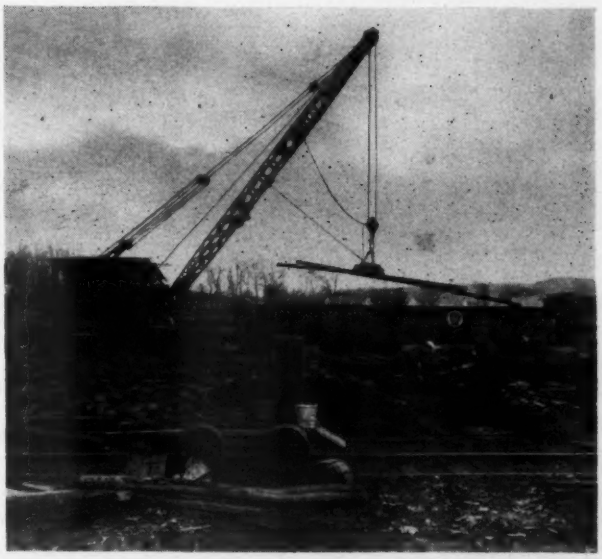
• • •

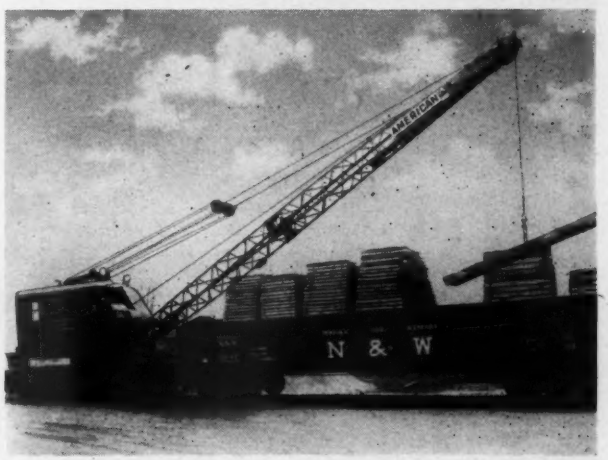
Other AMERICAN Materials Handling Methods for Railroads.

AMERICAN REVOLVER Gantry Mounted Revolving Crane.



AMERICAN General Purpose Hoist.





Now is the time to check your materials handling methods. Catalog 600-L-1A gives full particulars on the AMERICAN Locomotive Crane and illustrates how it is used with hook, magnet, and bucket.

4435

Plan now . . . but wait for **AMERICAN!**

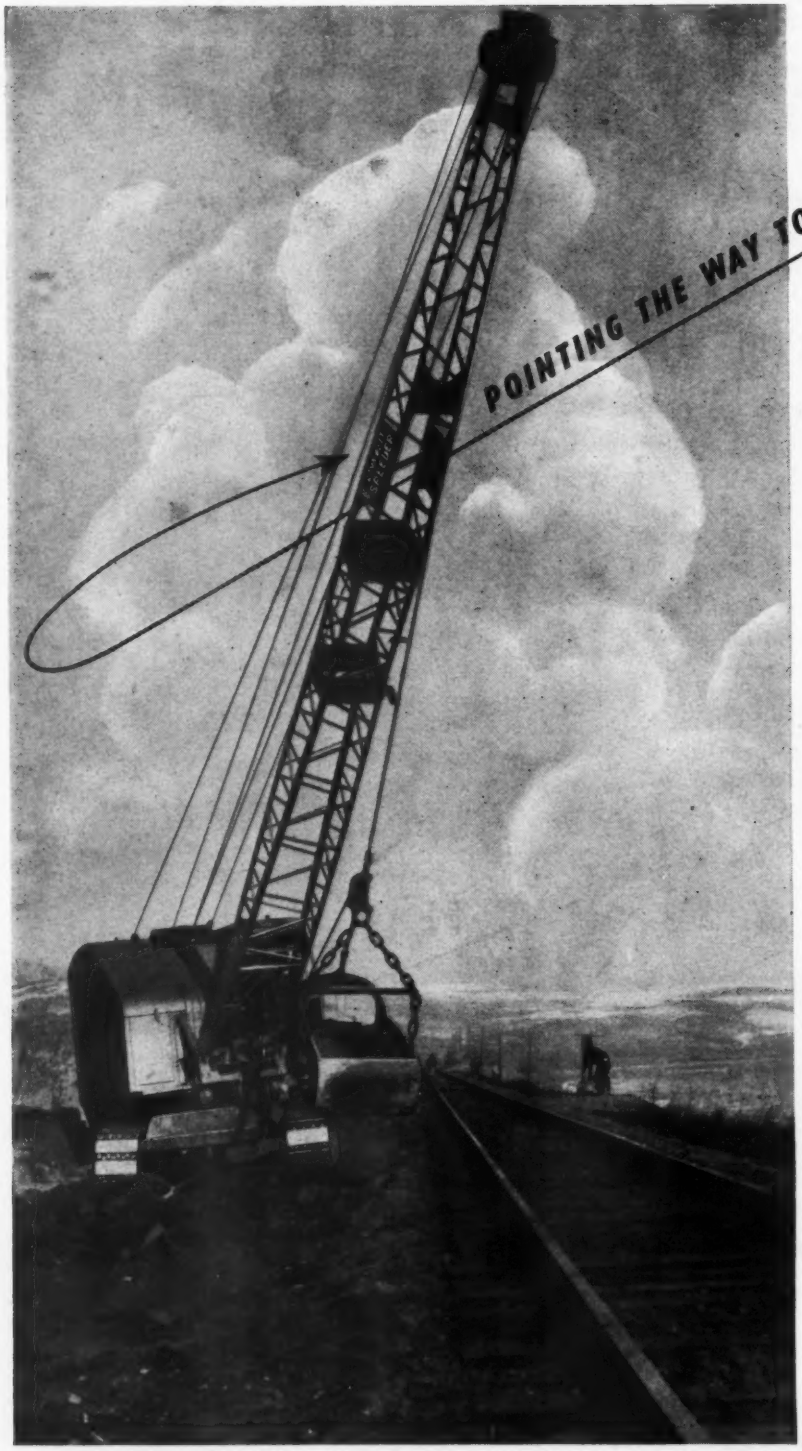
AMERICAN MATERIALS HANDLING *for* EVERY INDUSTRY

AMERICAN HOIST & DERRICK CO.

Saint Paul 1, Minnesota

CHICAGO SAN FRANCISCO NEW YORK

Wherever wire rope is fastened . . . use genuine **CROSBY CLIPS** *with the Red-U-Bolt*



POINTING THE WAY TO POST-WAR EFFICIENCY!

ON THE

UNION PACIFIC

—Keeping Maintenance Work

MOVING FAST with a LINK-BELT SPEEDER

High speeds will be the order of the day during post war and fast, economical banking, ditching, grading and maintenance will spell success in maintaining much of the present traffic peak for post war revenues!

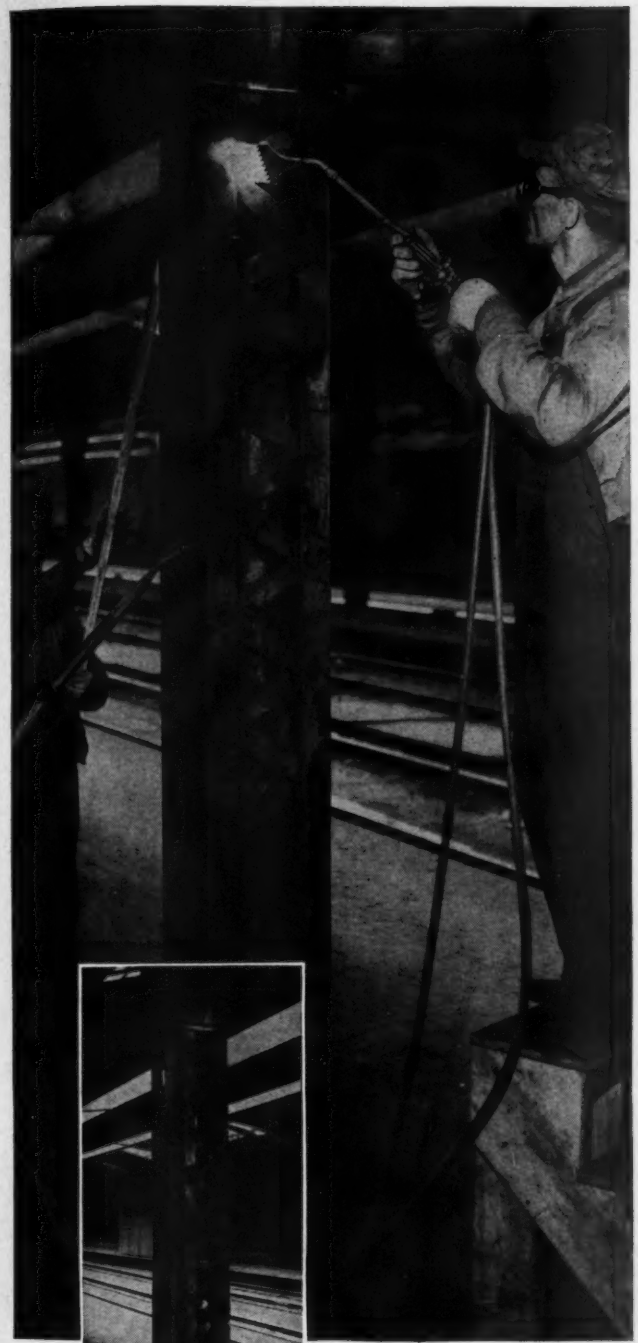
LINK-BELT SPEEDER

Builders of the Most Complete Line of

SHOVELS-CRANES-DRAGLINES

LINK-BELT SPEEDER CORPORATION, 301 W. PERSHING ROAD, CHICAGO 9, ILL.

A DIVISION OF LINK-BELT COMPANY



(Above)—Station shed columns being flame-cleaned. (Left)—The flame-cleaned column ready for painting.

Flame-Cleaning

Speeds Repainting of Structural Steel

● Oxy-acetylene flame-cleaning by Oxweld's method is a quick and economical way to remove residual paint, scale, rust, and moisture from structural steel preparatory to painting. This procedure is particularly useful on irregular or other hard-to-get-at surfaces such as the train shed column shown here, where the downspout inside the column had to be cleaned as well as the outer surfaces. On this job, Oxweld's flame-cleaning method removed scale and paint from these columns so effectively that the steel was cleaned down to its original surface for the first time in nearly 30 years. As a result, a quicker, better, more lasting paint job was made possible. Flame-cleaning is also being used to good advantage on tanks, bridges, pipe, cars, coaches, and many other steel structures.

THE OXWELD RAILROAD SERVICE COMPANY

Unit of Union Carbide and Carbon Corporation

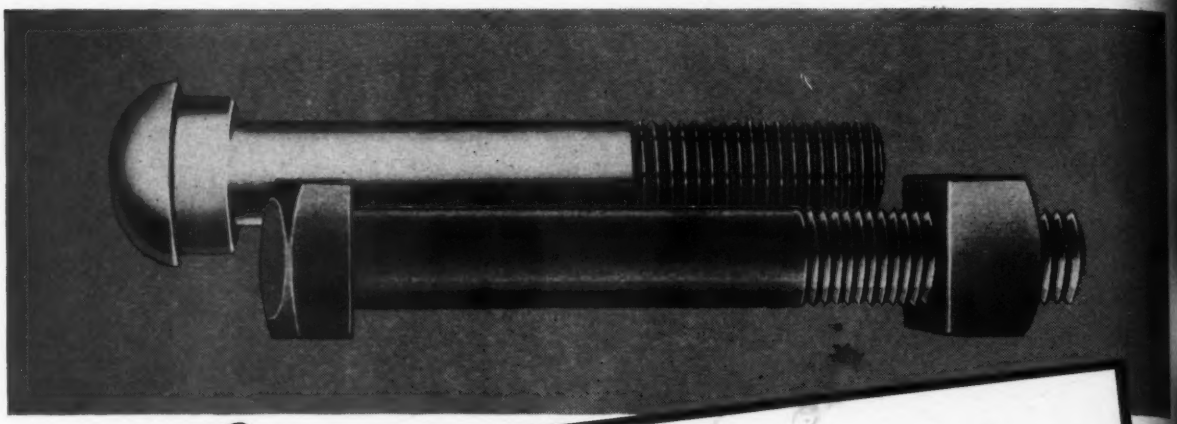
UCC

Carbide and Carbon Building — Chicago and New York

BUY UNITED STATES WAR BONDS AND STAMPS

OXWELD RAILROAD SERVICE

SINCE 1912—THE COMPLETE OXY-ACETYLENE SERVICE FOR AMERICAN RAILROADS



for

ACCURACY—THAT MEANS FASTER ASSEMBLY

QUALITY—THAT MEANS LESS MAINTENANCE

SPECIFY OLIVER TRACK BOLTS

We have often heard experienced travelers remark, "I always ride the 'such-and-such' railroad, because the roadbed is so much smoother and there is no annoying *clack clack* of wheels."

Maintenance men realize that this wheel *clack* is evidence of rail end-batter, one of the most costly railroad maintenance problems.

Oliver Track Bolts are built to help you minimize this problem through tight, solid rail joints. With plenty of extra, built-in *toughness,* they pull-up tight and *stay tight.* They easily resist the tremendous shear and tension stresses imposed by high-speed, heavy wartime traffic. The oval neck fits the joint bar *just right;* clean, accurate threads mean faster threading; properly designed nuts assure full measure of reliability. Investigate the advantages of Oliver Track Bolts for your right of way.

Oliver Quality Products for the Railroad Industry include

- Screw Spikes
- Gage Rods
- Structural Bolts
- Frog Bolts
- Connecting Rod Bolts
- Car Builders Specialties

OLIVER
IRON AND STEEL
Corporation

Write today for Copy of Oliver Catalog No. 4 "RAILROAD ACCESSORIES" —filled with factual data.

SOUTH TENTH AND MURIEL STREETS, · PITTSBURGH 3, PA.

PULLING POWER

Pulling Power for longer trains and heavier loads to meet today's stepped-up schedules has been provided by the railroad industry through its unlimited resourcefulness.

Experienced railroaders know that the volume and speed of traffic movement can be increased only so far as the stability of the road bed permits.

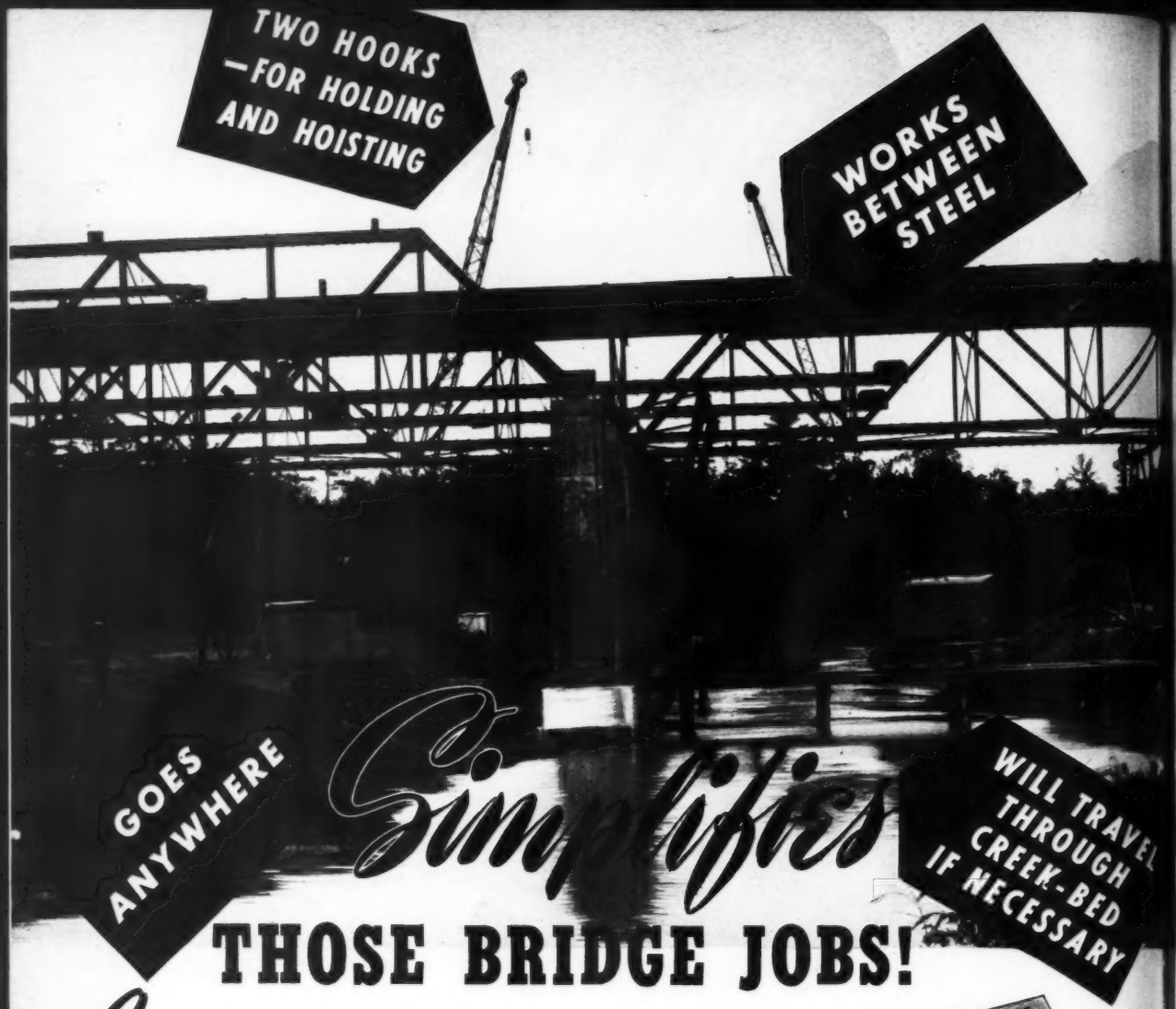
In the inspection and maintenance of the right-of-way Fairmont Motor Cars have played a vital role. Every day these dependable vehicles, with their greater pulling power, are saving time and man power in the transporting of men and equipment needed to keep track, switches and signals in safe operating condition.

That Fairmont Motor Cars are doing an outstanding job is evidenced by the fact that over half of all the railway motor cars in service today are Fairmonts. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Performance ON THE JOB COUNTS

The motor car illustrated is the Fairmont S2 Series E . . . A broad service, Standard Section Car for 1 to 8 men. Bulletin 439 will give you complete details.

Fairmont Railway Motor Cars



THOSE BRIDGE JOBS!

COMPARE this method of bridge construction with that of doing the job with a stiff leg, or locomotive crane. Your Northwest goes practically anywhere—even in the stream if required. It works up between the steel. Two hooks can be supplied if necessary, or the boom can be hooked up for "live" operation for maximum versatility. The "feather-touch" control permits movements of fractional inches introducing greater accuracy and safety into steel handling.

Booming is under power both up or down. An automatic brake prevents running down the worm and dropping the boom. Smooth, easy swinging, without jerking, results from the uniform pressure swing clutches and permits nice handling on steel work or when working from cars or in aisles between trains.

It's a railway man's machine and from engine to boom point, it is designed to meet the tough problems characteristic of railroad work.

Northwests are solving maintenance of way and store yard problems for fourteen class one railroads. Let us tell you who these are and what Northwests are doing for them.

NORTHWEST ENGINEERING COMPANY
1713 Steger Building 28 E. Jackson Blvd. Chicago 4, Illinois

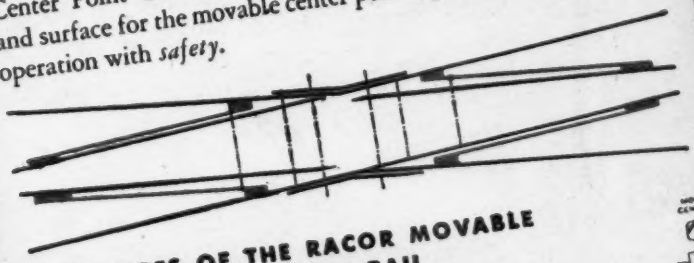
NORTHWEST

THE ALL PURPOSE RAILROAD MACHINE
SHOVEL • CRANE • DRAGLINE • PULLSHOVEL

RACOR

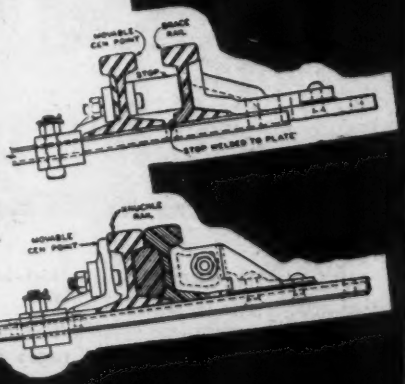
INVASION SUPPLIES CAN'T *Wait...*

When the Generals call for supplies, the railroads of the nation must continue to keep the long lines of cars rolling day and night. Speed, coupled with Safety, is a greater "must" than ever before. One of the important features of RACOR Movable Center Point Crossing Brace Rail is the improved alignment and surface for the movable center points, permitting *high speed* operation with *safety*.



FEATURES OF THE RACOR MOVABLE POINT BRACE RAIL

1. The brace rails provide lateral support for the flexible portion of the movable points the same as provided by stock rails in ordinary switches.
2. Ties the entire crossing into one unit.
3. Renders other anti-creeper arrangements unnecessary.
4. Ruggedness of the structure guarantees economy by lower maintenance costs, especially at the heel joints.
5. Improved alignment and surface for movable center points permit *high speed* operation with *safety*.



Brake Shoe

RAMAPO AJAX DIVISION

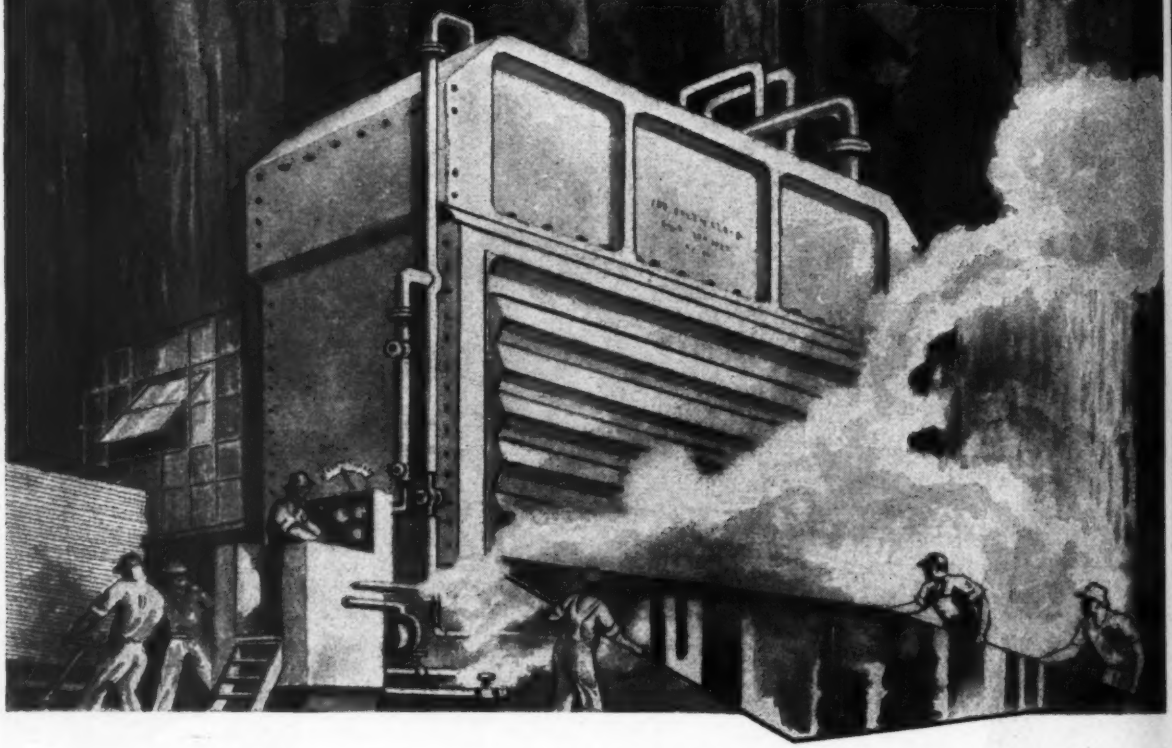
230 PARK AVENUE, NEW YORK 17, N. Y.

HILLBURN, NEW YORK — PUEBLO, COLORADO
NIAGARA FALLS, N. Y. — SUPERIOR, WISCONSIN
CHICAGO, ILLINOIS — LOS ANGELES, CAL.
EAST ST. LOUIS, ILL. — SEATTLE, WASHINGTON
NIAGARA FALLS, ONTARIO

From the Douglas Fir Forests and the Plastics Industry comes a *NEW* tested material

INDERON

THE STABILIZED STRUCTURAL PRODUCT



What is INDERON?

INDERON is a new material, combining the advantages of two other proven materials —fir plywood and plastics. It is composed of three basic ingredients: strong, durable Douglas fir veneers, a plastic-impregnated fibrous film, and an internal adhesive of thermosetting resin. INDERON is neither a plywood nor a plastic. It is, in effect, an alloy which possesses the qualities of a true plastic at a cost comparable to finished plywood. It is manufactured in modern West Coast plywood plants, where Douglas fir veneers, phenolic adhesives and resin-impregnated paper are chemically united in high-heat, high-pressure presses.

What are the advantages of INDERON?

Because INDERON combines the best qualities of both plastic and plywood, it is available in larger sheets and can be produced cheaper than an ordinary plastic. Yet it is permanently insoluble and affords a marked resistance to chemical or mechanical destructive elements. In strength value it compares favorably with aluminum. It is dimensionally stable, inexpensive, easy to work, and requires no surface protection. In peacetime application it will be available in permanent colors, designs and patterns— all of which will be an integral part of the product itself!

How can you plan to use INDERON?

At present, INDERON is available only for Army-Navy uses. When it is no longer so urgently needed for war, INDERON will serve a wide range of uses in many industries. For example: INDERON is ideal for marine application. It will resist salt water, terrific strains, impact blows, abrasion, corrosive and toxic fumes. In the building field, INDERON will serve as roof, walls, floors and built-ins for tomorrow's homes. Furniture will be made both strong and beautiful with this new structural product. It will be applied to special packaging, to prefabrication, to many another field. Learn more about INDERON—

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Tacoma 1, Washington
Washington Veneer Co.
Olympia, Washington
manufacturers

INDERON

THE *Stabilized* STRUCTURAL PRODUCT

★ FIRST ON THE RAILS AND STILL FIRST ★

Designed by Men Who Know Railroading

Fairbanks-Morse Sheffield and Eclipse Motor cars are still first on the rails because they have *all* of the features a car should have . . . and all of those features are *good.*

There are 12 models—water cooled, air cooled, chain drive, belt drive. *Eclipse* models are belt-driven. *Sheffield* Models are chain-driven.

Sheffield
Model 40B with cab

Two-cylinder air-cooled engine permits full load operation for hours without overheating. Engine develops exceptionally high torque at low speeds. Friction transmission. Chain drive. Steel frame. Thousands in service.

Sheffield Model 40B with special safety railing

Sheffield Model 53
Weighs 929 pounds with rear end lift of only 124 pounds. Has 8- to 13-hp., water-cooled motor with air-cooled head. Space for full section gang and tools.

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Manpower shortages call for mechanical short-cuts. Barco Unit Tytampers will enable you to get more work done with fewer hands to do it. They're efficient, low in operating cost, adaptable to widely differing conditions. And they have a long record of faithful service on American railroads from coast to coast. For full information, address: The Barco Manufacturing Company, Not Inc., 1805 Winnemac Avenue, Chicago 40, Ill.

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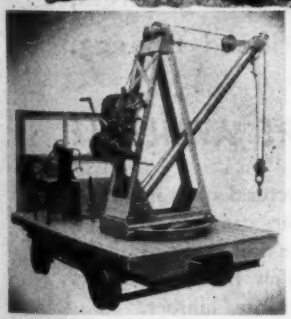
SPEED CONSTRUCTION and REPAIR WORK



The Kalamazoo No. 39B Bridge Gang Motor Car is self-propelled. Derrick specifications are the same as on the Kalamazoo "4".

SAVE TIME AND MANPOWER with this sturdy utility derrick car. Ideal for handling heavy timbers, rails and material up to 3000 pounds. Quickly adjustable rail clamps furnished for use on loads over 1700 pounds. Special steel frame and extra wide platform amply allow for material transportation. The seven foot boom with 360° travel on roller swivel base permits operation on all sides. Heavy and light lifts are efficiently handled by the two-speed winch. Derrick can be removed easily allowing car to be used for other work.

For further information send for Bulletin D-4.

KALAMAZOO MEANS SERVICE TO YOU

MANUFACTURING SINCE 1883

KALAMAZOO RAILWAY SUPPLY CO.

KALAMAZOO, MICH., U. S. A.

67 TECO TIMBER FABRICATORS *At Your Service* FROM COAST TO COAST

TECO 111' BOWSTRING TRUSSES 20' O. C.
Designed and built by McKeown Brothers Company, Chicago, Ill., for Department of Public Works, City of Chicago, Ill.

Experienced nation-wide timber fabricators with large productive capacity have produced thousands of large and small war jobs... they continue to turn out timber structures on time... and these plants are serving private industry in postwar planning of Clear Span Roof Trusses, Bridges, Heavy Structural Framing, Barges, Towers, Power Lines, Glued Laminated Construction, Prefabricated Housing.

HEAVY STRUCTURAL DIMENSION AND TIMBERS ARE AVAILABLE

The War Production Board states 3" and 4" Dimension and Timbers are readily available for essential uses...The lumber manufacturing industry recommends that 3-inch and thicker lumber be specified for essential construction uses as a stimulus to the production of the much needed 1-inch and 2-inch lumber, which generally is produced along with structural and timbers... Specifying and design officers can help by specifying timber construction using these available sizes and dimensions.. Well balanced orders facilitate maximum production of lumber.

Write us for list of timber fabricators who use the Teco connector system of construction.

TIMBER ENGINEERING COMPANY
WASHINGTON · CHICAGO · MINNEAPOLIS · NEW ORLEANS · PORTLAND

Specify **TECO CONNECTORS AND TOOLS**
Endorsed by Leading Lumber Manufacturers and Fabricators

Cutting Costs

THE BUDA COMPANY

GENERAL OFFICES AND WORKS

HARVEY, ILLINOIS
(CHICAGO SUBURB)

May 10, 1944

Mr. H. H. Cohenour, Adv. Mgr.

Dear Howard:

I thought you might be interested in the following remarks which I received from a Track Supervisor on one of the largest Class-A railroads in the United States.

"I am saving 4¢ per tie installation with the BUDA Tie-Nipper, and I am putting in a requisition for a BUDA Tie-Nipper for each section."

Reports of this nature are not uncommon in our sales division. If you want this man's name I have it on file.

Regards,
THE BUDA COMPANY
Roy P. Williamson
Manager, Railroad Division

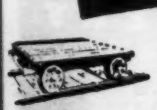
RPW:AMD

REPORTS of this type are common to us, we reproduce this letter merely to focus your attention upon an indisputable fact—that BUDA track tools are efficient and economical.

Track Jacks—
Sturdy, durable jacks in many models speed up maintenance jobs.

Rail Bender—
One man bends up to 151 lb. "T" rail cold.

WRITE OR WIRE FOR BULLETINS



PUSH CARS

JACKS

BUDA

15403 Commercial Avenue
HARVEY (Chicago Suburb) **ILLINOIS**

MOTOR CARS

PUZZLE: HOW TO LINE A TUNNEL WITHOUT DISRUPTING TRAFFIC?

That sounds like a tough one, doesn't it? Actually the solution was easy, as Denver and Salt Lake Railway engineers discovered. The answer? Rex Pumpcrete—the pump that pumps concrete through a pipe line.

Concrete was mixed in a Rex 14S mixer located at the nearest tunnel portal or most adaptable site and pumped by Pumpcrete through a six-inch pipe line to the top center of 10-foot length steel forms. Forms, collapsible at top center, were equipped with rollers for easy transportation. For long moves they were carried in flat cars.

Pumpcrete eliminated the need for scaffolding, chutes, and other bulky equipment. As many as 30 trains a day passed through the tunnel without delay and the Pumpcrete kept right on pumping as the trains passed by.

Many other important railroad constructions, culverts, underpasses, bridges, snowsheds or station work are "concrete by pipe line" jobs. Pumpcrete simplifies concrete placement because it can move concrete 1200 feet horizontally or 120 feet vertically, eliminating the need for erecting structures that might delay rolling stock. Seven major railroads use Pumpcretes for a wide variety of concreting needs.

For complete information on Pumpcrete send for your free copy of Bulletin No. 404. Chain Belt Co., 1601 W. Bruce St., Milwaukee 4, Wis.

Tunnel on Denver & Salt Lake Railroad being lined with concrete. Pipe line at right carries concrete from Pumpcrete, 600 feet distant, to top center of steel forms.

Machine at left is a Rex 14S Mixer. It discharges concrete into the round hopper of the Pumpcrete below.

REX

CONSTRUCTION MACHINERY

PUMPS PAVERS PUMPCRETES MOTO MIXERS MIXERS

OVER THE HUMP! America's miracles are no longer news—its record in this war is a succession of miracles. But there is one accomplished "impossibility" which deserves special mention: *The job our Railroads are doing!*

Shortage of equipment and depletion of man-power notwithstanding—they have climbed the grade with "know-how," courage and patriotic devotion.

Raw materials have been delivered to our war industries—on schedule. Finished weapons have appeared—when and where wanted—as if by magic.

Millions upon millions of troops have been transported punctually and without incident. Meanwhile, somehow, our civilian needs have been met.

All in all, a feat of logistics that staggers the imagination!

HOUDAILLE* salutes the *Railroads of America* for distinguished service, above and beyond the line of duty. Never before has their place in our national economy, in our way of life and in our hearts been so secure.

We of Houdaille are proud to have served the Railroads in the past. We are serving them now. We hope increasingly to serve them in the great, new America, after this war is over.

BUY U.S. WAR BONDS

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Executive Offices—Detroit

Manufacturers of precision parts and equipment for the automotive, aircraft, railway, maritime, mechanical refrigeration, radio and other industries

*Pronounced: **"HOO-DYE"***

© 1944 HOUDAILLE-HERSHEY CORPORATION

WHAT *Beauty!* WHAT *Grandeur!*

WHAT A HEADACHE!

Roadbeds overlooking lakes and rivers may give the passengers a scenic thrill, but pounding waves or biting erosion may also run the maintenance engineer dizzy trying to keep the embankment from slipping into the water.

The practical solution for erosion—and other unstable slopes—is the ARMCO Bin-Type Retaining Wall. This strong wall overcomes unequal settlement without cracking or bulging. It is so easy to erect that unskilled men can do it in any season, with less excavating. The backfilling is done as the work progresses, to stop undermining during construction.

Efficiency and economy go hand-in-hand. Closed bin construction prevents loss of material from individual cells, and ARMCO Bin-Type Walls can be salvaged for another purpose or changed to meet other conditions in the same location.

Even though you may be unable to obtain ARMCO Bin-Type Retaining Walls for immediate construction, they will still be a good investment when you can start rebuilding your war-beaten roadbeds. Get complete information from Armco Railroad Sales Co. Incorporated, 691 Curtis St., Middletown, Ohio.

EXPORT: THE ARMCO INTERNATIONAL CORPORATION

ARMCO

ARMCO BIN-TYPE RETAINING WALLS

Extruded Seam Sealing Tape Seals Fuselage Joints of Lockheed's Giant "Constellation"

A Partial List of Industries for Which Presstite has Successfully Developed Special Sealing Compounds:

For the Aircraft Industry:
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Seaplane Floats

For the Refrigeration Industry:
Sealers for Domestic and Commercial Refrigerators.
Bonding and Sealing Low Temperature Insulation in Refrigerated Rooms

For the Railroads:
Sealers for Insulating, Soundproofing and Weatherproofing of Railway Cars—Sealing Car Windows and Spot Welded Seams

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Miscellaneous:
For Glazing Greenhouse Windows
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Ammunition Paints
Plus Many Special Products for the Army and Navy

Our Engineering, Technical, and Laboratory facilities are at the service of any industry with a sealing problem.

Built to fly faster, farther, and with bigger loads than any other land transport now in production, Lockheed's giant 4-engined 8,800 horsepower craft recently broke the transcontinental record from Burbank to Washington. The fuselage seams of this great carrier are safely sealed against weather and pressure with Presstite Extruded Seam Sealing Tape.

Thus another famous American airplane joins the ranks that include the "Flying Fortresses," "Commandos" and many others in which Presstite Sealing Compounds are used.

Your own sealing problems may not be as complex as those in the aircraft field where extremes in temperatures and pressures, plus constant strains and flexings, are encountered. But it is Presstite's wide experience in developing sealers for industry that has made such wartime achievements possible.

Presstite's engineers are *sealing specialists*—continually developing sealing compounds to meet specific requirements of industry and the Armed Forces. We'll gladly work with you, too, on your present and postwar sealing problems.

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3964 Chouteau Ave., St. Louis 10, Missouri
Sales Offices: Los Angeles 21, Calif., 2145 Bay St.; Detroit 2, Mich., 6432 Cass Ave.

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Boiler Lagging is Essential
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86 YEARS OF SERVICE TO TRANSPORTATION
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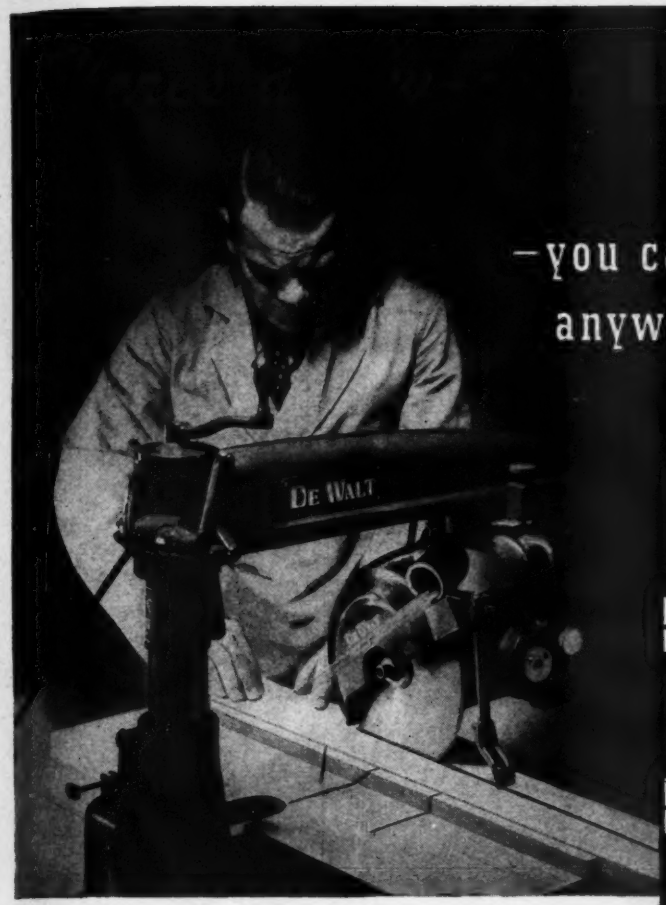
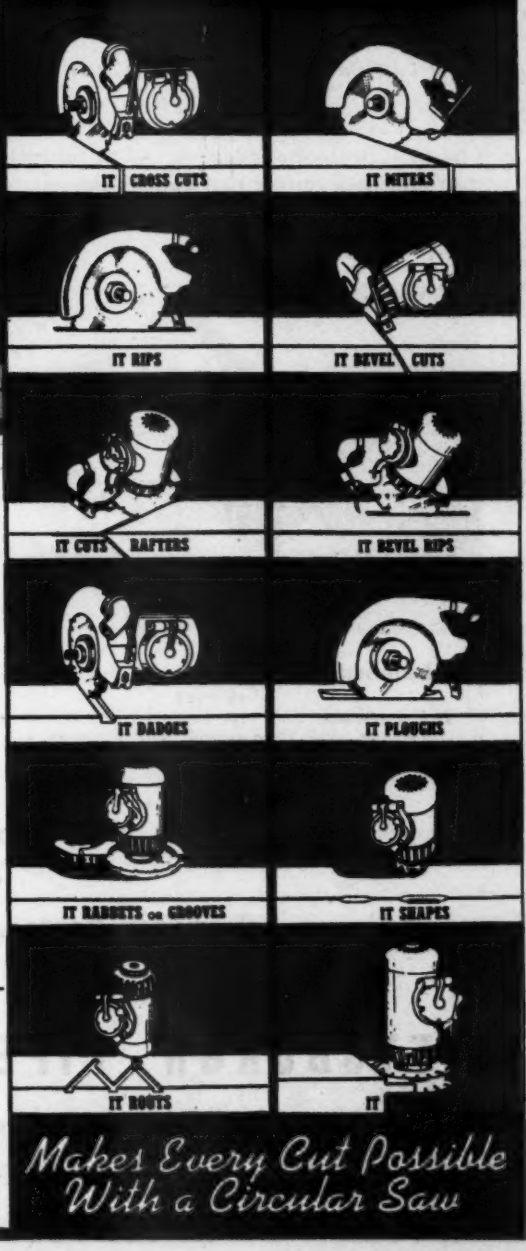


—you can use for many jobs anywhere in your plant!



STRAIGHT RIPPING

Here's the latest innnovation in wood-working machinery!

DeWalt is the answer to industry's need for a safe, easy-to-operate, adjustable, precision cut-off saw—for use in carpenter maintenance, pattern work, crating and boxing, production wood cutting, and for cutting and dapping timbers.

DeWalt is the ALL-PURPOSE machine that can be changed quickly, as required, from a straight-line cut-off saw—to miter saw—to rip saw—to dado machine—to shaper—or other operations that can be made with circular cutting tools.

No matter how, where or when you cut wood, there's a DeWalt that will reduce your cutting costs, conserve labor, simplify materials handling, save floor space, eliminate waste and actually reduce your investment in the wood-working machinery you require.

Illustrated above is the smallest of our many models. It is available in two sizes complete with motor: ½ HP one phase, AC, $125.00; ¾ HP three phase, AC, $135.00. The complete DeWalt line ranges up to 10 HP. If you're planning to buy a machine—make it a new DeWalt. Mail the coupon below—today!

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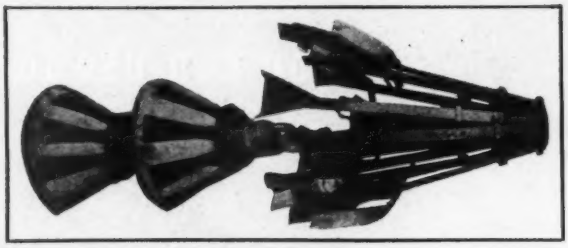
Makes Every Cut Possible With a Circular Saw

PIPE CLEANING PAYS

HYDRAULIC CLEANING TOOL



SPRING STEEL CUTTING PLOWS

Why endanger train service by lack of sufficient water?

You can have water lines cleaned by PITTSBURGH PIPE CLEANER COMPANY'S *effective, but simple hydraulic method:*

Cleaner is inserted at pumping end of line, which is then reconnected. Discharge end is opened. Water is then turned on forcing tool through the pipe, thus shearing away the scale. Water passing through cleaner forces dirt out ahead.

Mud and scale pouring out of the discharge ahead of cleaner.

Before cleaning, this pipe delivered 312 G.P.M. at 115 lbs.; after cleaning, 662 G.P.M. at 88 lbs.

Clean water gushing from pipe with cleaner partially ejected from main.

Actual cleaning time was 57 minutes.

Let Us Help You Keep Them Rolling

with our

COMPLETE CONTRACT PIPE CLEANING SERVICE

PITTSBURGH PIPE CLEANER COMPANY

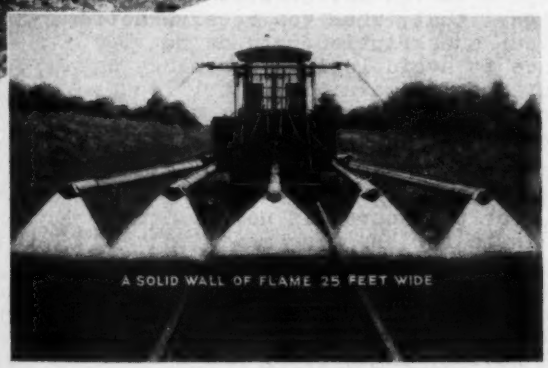
433 Melwood Street, Pittsburgh 13, Penna.

PHILADELPHIA · NEW YORK · BALTIMORE · WASHINGTON · CHICAGO · ST. LOUIS · DETROIT

FINE TRAINS
Require Fine (Weed Free) Track

CENTRAL OF GEORGIA

The Southland, crack Chicago-Florida train, traveling 60 miles an hour on the Atlanta-Albany line of the Central of Georgia.



Woolery 5-burner in operation

Typical Weed Free Track on the Atlanta-Macon Division

TO INSURE a roadway comparable with the City of Miami, the Southland, the Dixie Flyer and other nationally known trains, the Central of Georgia uses Woolery Weed Burners—15 of them—to provide Weed Free Track. These burners keep tracks free of vegetation the economical way—and they save labor where it helps today.

On this road, as on more than seventy-five other roads, hundreds of Woolery Weed Burners are demonstrating their efficiency in actual day-to-day use. They are available in 5-burner, 3-burner, 2-burner and 1-burner models.

WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS . MOTOR CARS . TIE CUTTERS . TIE SCORING MACHINES . RAIL JOINT OILERS . CREOSOTE SPRAYERS . BOLT TIGHTENERS

EXCLUSIVE EXPORT REPRESENTATIVES: PRESSED STEEL CAR COMPANY, INC., PITTSBURGH, PENNA.

No. 187 of a Series

Railway
Engineering and Maintenance
SIMMONS-BOARDMAN PUBLISHING CORPORATION
105 WEST ADAMS ST.
CHICAGO, ILL.

Subject: We Don't Like to Do This But--

July 1, 1944

Dear Reader:

Under the caption We Don't Like to Do This But--I received a letter a few days ago advising me that "we shall have to stop sending you Country Gentleman unless you are a farm owner or otherwise connected with the vital business of producing, processing or distributing food"--this in spite of the fact that the publisher had accepted payment more than a year ago for a subscription that does not expire until February, 1948. Since I cannot qualify under the limitations outlined, I face the cancellation of my subscription to a magazine that I have enjoyed reading for years.

I cite this letter as evidence of the lengths to which publishers are being forced to go to keep within the quotas of paper fixed by the government. To date, we have not been forced to take such drastic measures although we have "frozen" the circulation of Railway Engineering and Maintenance and all of our other Simmons-Boardman papers. We are also cutting off all subscriptions promptly at expiration, without the customary 30-day period of grace. We have cut to the bone the number of copies provided for staff use and are adopting every other expedient designed to eliminate waste in paper. With this issue we are again reducing the weight of our paper--from 40 lb. to 35 lb.--effecting a further saving of 12½ per cent in paper used, although we do not believe that this reduction will be evident to you in either decreased opacity or bulk by reason of the addition of a slight amount of titanium, a new develoopent of our paper maker.

I am giving you these facts in order that you may appreciate our problems in serving you and understand the reasons prompting some of the changes in our practices that you may observe from time to time. In this connection I suggest that, when you receive notice of the approaching expiration of your subscription, you do not lay it aside but send your check at once to avoid losing your place on our lists and being placed on a waiting list awaiting other lapses and cancellations. (One publisher of business papers now has 35,000 such subscriptions on its waiting list.)

And I want to add one more suggestion--that each of you search your home and your office to clean out all old paper and all old files that can safely be released, for this paper is needed desperately for conversion into containers for shipping munitions and other materials of war. By such action you can do much to insure your continued receipt of your magazine, for the military authorities are going to get the containers they need and if sufficient old paper does not come out, they will draw on the supply of pulp from which the paper for magazines like Railway Engineering and Maintenance comes. Your co-operation in this activity will, therefore, provide insurance for you as well as us.

Yours sincerely,

Elmer T. Howson

ETH:GP

Editor

MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

Photo Courtesy Louisville & Nashville R. R.

Duff-Norton Jacks

provide "experienced helpers" on bridges and structures as well as track work.

Duff-Norton Jacks are your best bet for speed, power and long service life! These husky Jacks help with the work all along the way, from track work to your bridge and structure maintenance.

Use Duff-Norton Jacks . . . they're "mechanical muscles—experienced helpers" for your crews. Catalog 202 on request.

The
DUFF-NORTON MANUFACTURING COMPANY
PITTSBURGH, PENNSYLVANIA · Canadian Plant: Coaticook, Quebec
Representatives in Principal Cities

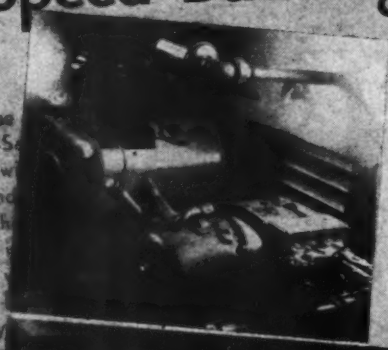
JACKSON
Portable Power Plants

The portable and adaptable features of JACKSON Portable Power Plants—WS-4 and WS-8—simplify the work of B & B departments. The accompanying illustrations and description, which appeared in March **Railway Engineering & Maintenance**, dramatically demonstrate this statement. And, in furnishing power for JACKSON vibratory tie-tampers, the JACKSON portable power outfit has a record of nearly 25 years' dependable performance on leading railroads.

Working end of tool car showing numerous tools powered by JACKSON Portable Power Plant.

Power Tool Cars

Speed Building Work on the Frisco



Power Unit

Power for all the equipment and tools in the car and for lighting is furnished by a WS-8 portable Jackson power unit. This unit has two wheels and a pedestal type leg. It is bolted to the floor but can be removed for use in emergency work or as a power unit for the portable tools when it becomes necessary to use them at points remote from the car. It has a Wisconsin-type VE-4 engine of about 12 hp. capacity and a generator with an output of 5 k.v.a. of 120-volt, 60-cycle a-c. current with both 3-phase and single-phase outlets. This power plant has sufficient capacity to operate all the power equipment in the car at the same time.

Above—Close-up of the Power Unit. Below—The Power End of the Car, with Jointer and Table Saw in Foreground. The Power Unit is Located in the Corner Behind the Table

ELECTRIC
TAMPER & EQUIPMENT
CO.
LUDINGTON MICHIGAN

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

JULY, 1944

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Describes installation of continuous welded rails in mile-long tunnel, which were joined by a new thermit weld

Labor Turnover—What the Milwaukee Is Doing to Reduce It - - 612

Address by J. P. Kiley before Superintendent's Association tells of specific methods used by his road to minimize labor turnover

Water Service Facilities—Pollution of Wells—Intakes, etc. - - 615

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Adapting Salvaged Steel Presents Special Problems - - - - - 618

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Information from Compressed Air Institute explains proper operation and maintenance to get long life and greatest efficiency

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Some New Developments in Maintenance Materials - - - - - 621

Article by C. B. Bryant discusses some of the newer non-corrosive materials and modern methods of protecting steel from corrosion

Chesapeake & Ohio Extends Practices in Treatment of Timber - 622

Abstract of recent address by H. M. Church before meeting of Wood Preservers' Association, tells of use of salt-treated timber

Specialties Increase Safety of Motor Car Operation - - - 623

Describes devices applied on Missouri Pacific motor cars for holding water kegs and tools, and for lifting the cars

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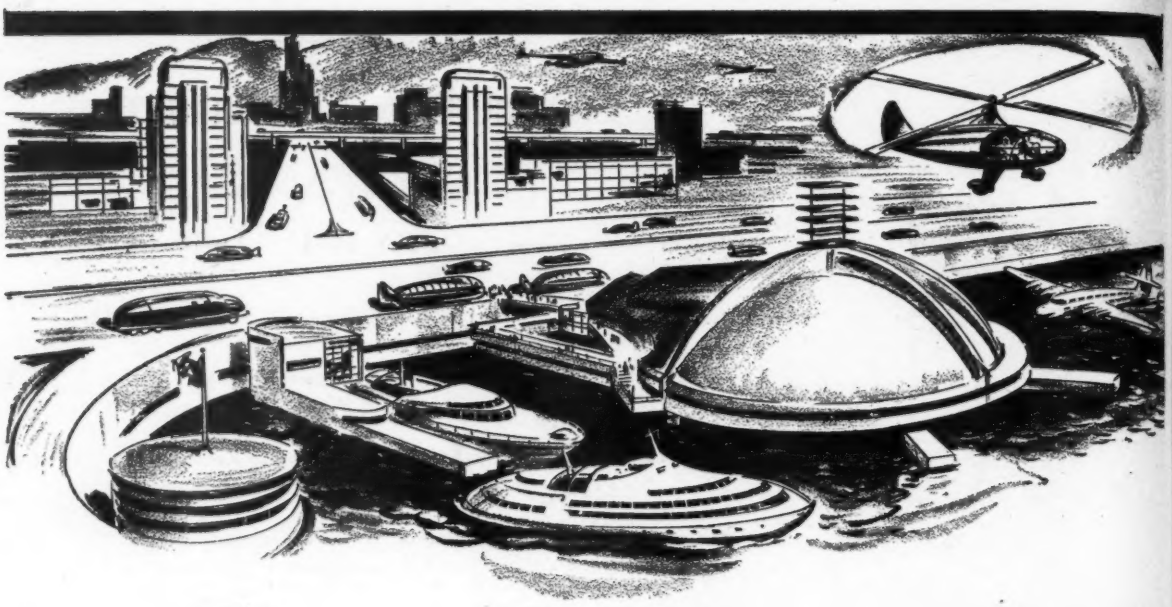

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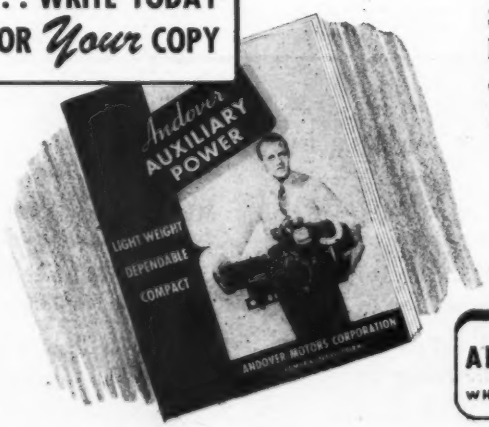

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Railway Engineering and Maintenance

Alert?

Are the Railways on Their Toes?

Are the railways static? Are they satisfied with their status? Are they indifferent to possibilities for improvement, as charged by some of their critics? Or are they alert to improve their service and quick to apply scientific discoveries and developments to their operations? Let us review their record.

Take passenger trains, the first and most frequent point of contact with the public. The development of the Diesel engine and of lightweight metals first made possible the lightweight streamlined train in 1934; in the next seven years, before war stopped their construction, the railways of the United States spent more than $200,000,000 for 133 such trains and hundreds of additional cars incorporating these developments.

Likewise, the air conditioning of passenger cars first became practicable less than twenty years ago, and in the next 13 years the railways spent more than $75,000,000 to install air conditioning apparatus in more than 12,000 cars, making possible the almost universal equipment of through trains, with sufficient cars left over to provide this comfort on many secondary or local trains as well.

In motive power, the Diesel locomotive is less than 20 years old; yet the railways today have hundreds of Diesel locomotives in switching service and, in addition to the Diesel powered streamline passenger trains, have scores of locomotives in freight service, in units up to 5400 h.p. The railways are also studying intensively the further possibilities of steam locomotives and of electric operation.

Nor is the quest for improvements confined to equipment. Improvements of equal or greater variety are to be found in roadway.

Take the rail flaw detector. As a result of an investigation started in 1920, means have been perfected for detecting the presence of transverse fissures and certain other defects in the interior of rails, by means of which more than 30,000 rails, each a potential hazard to traffic, are removed from track each year before failure occurs. Practically every important main line track is today checked one or more times each year to detect and reveal such incipient causes of trouble.

Of equal importance has been the discovery, through a comprehensive research investigation of more than ten years duration, that these transverse fissures have their origin in microscopic shatter cracks formed in the rails during their cooling and that this cause can be eliminated through "controlled cooling." Although this development is less than ten years old, practically all the rail rolled for the railways today incorporates this provision.

Nor is the record completed, for there are now in progress, among many others, elaborate and highly technical field investigations to determine (a) the effect of impact on stresses in bridges, looking to the revision of specifications for their design; (b) the relation between track and rolling stock, the first progress report on which is about to be released; and (c) variations in the tension in track bolts in service and the newspapers are now carrying stories almost daily of trial runs of freight trains carrying locomotive-to-caboose means for communication.

No, the railways are not static. Their managements are alert to every development in science. The next decade will see the greatest development in railway operation in history.

Employee Training—

Has Valuable Place in Maintenance Department

STIMULATED in part by the large turnover in their ranks since the start of the war, with its influx of inexperienced employees, and in part by the favorable experiences in war industries, the railways are today giving more attention to employee training than ever before, for the dual purposes of developing trained supervisory personnel and of fostering maximum skill and production among the rank and file of their forces. However, in spite of the beneficial results that are accruing to those roads and departments in which it has been tried, the railways as a whole still have a long way to go to reach the level of what is being done in job training in some industries, and they have hardly scratched the surface insofar as their maintenance of way and structures employees are concerned. In fact, few railway officers, and especially few maintenance officers, have yet acquired any conception of the possibilities inherent in properly organized and conducted programs of employee training.

An outstanding exception to the general rule is the Erie, on which, in a continuing program during the last year, more than 2,000 supervisory officers have been trained in better methods of teaching the employees under their jurisdiction the most effective ways in which to perform their assigned duties. To date, the subjects covered in the Erie's training program have included, How to Teach a Man to Do a Job; How to Handle Questions, Objections or Grievances; How to Encourage and Maintain Enthusiasm, and How to Promote Safety—and among those given the training have been higher engineering and maintenance officers, division engineers, track supervisors and master carpenters. Supplementing this program, the Erie has instituted a Job Methods Training course, which reaches down through the men in the ranks, teaching them the most practical and effective methods of doing specific jobs.

The effects of these methods of employee training are said to be evidenced in the work of every department on the road. Officers in charge testify enthusiastically to the benefits that have accrued in maintenance of way and structures work, and their conclusions are substantiated by facts contained in the first article in this issue, describing the recent welding of the track rails into long lengths in the Otisville tunnel of the road, involving technics entirely unknown to the men at the start of the work. In this work, which involved making 286 Thermit full-fusion welds in track, the welding crew was trained directly on the job. Under the methods of instruction employed, the men were quick to learn the procedure and to gain speed and proficiency in making the welds. This is seen in the fact that whereas the output on the first day, when detailed instruction was given, was only 10 welds, it jumped to 22 the second day, to 27 the third day, and gradually increased until the maximum output of 42 welds was reached in a single day.

What the Erie is now doing in employee training is being done in a less proficient and effective manner on many other roads, as it was, in fact, done on the Erie itself until the adoption of its new detailed and intensive methods. Especially in the light of present conditions, involving the employment of thousands of men with little or no experience in maintenance of way and structures work, and the upgrading of thousands of other men to new and enlarged responsibilities to fill vacancies created by losses to the armed forces and other industries, skillfully designed and executed employee training courses are specially attractive, and deserve the consideration of many maintenance officers who have given them little thought in the past.

Neglect—

To Obey Rule Causes Death

FAILURE to do the thing that ought to have been done by the employee who was directly responsible for doing it, coupled with lack of observation on the part of his supervisory officer, resulted indirectly in the death of one man and the injury of two others. This incident, which is described on a later page, is one of a series of accidents that have occurred recently as a result of neglect on the part of maintenance of way employees to obey clear-cut rules, all of which have resulted in both fatalities and personal injuries. In each of the cases cited, strict obedience to the rules would have prevented the accident, and men are dead who should be alive today.

Every employee who is placed in a supervisory or other equally responsible position is required to familiarize himself with the rules that have been prepared for the guidance of employees. If he is not familiar with them, he is not fitted to have charge of men or to be given employment when the safety of persons, of property or of trains may be affected by his actions. If he is allowed to assume such duties without a satisfactory knowledge of the requirements laid down by the rules, his superior officer has been derelict in his duty and is equally responsible with him for any disaster that may arise as a result of his failure, because of ignorance of the requirements to take the correct action in connection with a given set of conditions.

Having once placed a man in a responsible position, it is equally the duty of the supervisory officer to know that he does not lose this familiarity and that he remains alert to obey the rules as they apply to conditions which arise. He should assure himself from time to time that his subordinates are "up" on the rules and that they do observe them. In the case under discussion, although there was a specific rule that "scrap spikes and bolts must be picked up and taken to the scrap bin daily," this rule does not seem to have been enforced by the foremen or the roadmaster.

In fact, the investigation disclosed that a considerable amount of track scrap had been allowed to remain without attention for about two months. The section foreman testified that he was familiar with the rule and knew of the scrap, which had been left by an extra gang, but that he had been too busy with other work to pick it up as required. The roadmaster under whom the work was done admitted that he had made fre-

quent trips over this territory, but testified that he had not observed the presence of the scrap.

In its discussion of this accident, the Interstate Commerce Commission did not attempt to place the responsibility directly, since the immediate cause was evidently action by some outside person, although it did quote the rule which has been cited. Whatever the verdict might have been, however, the stark fact remains that one man is dead and two others were injured through failure to enforce a rule.

Milkweed Pods—

If Children Collect Them on the Right of Way?

APPARENTLY, the present summer will see thousands of school children romping over railroad rights of way and tracks collecting milkweed pods to help the war effort—collecting the pods in a campaign instituted by the Commodity Credit Corporation of the War Food Administration to secure 1,500,000 lb. of milkweed floss for use in life jackets, filling out a shortage in kapok, and romping on the tracks as well as the adjacent right of way, because if children are permitted to roam the right of way, it will be almost impossible to keep them off the tracks. This entire project is fraught with serious implications—hazards—and regardless of the outside supervision that may be afforded the children, will place serious additional responsibilities upon all track supervisory officers.

Few other industries have shown a greater desire to co-operate in the war effort than the railways. This has been demonstrated adequately. In this present matter they do not question the need for milkweed floss for essential war purposes, and already, on numerous roads, orders have gone out to roadmasters, supervisors and track foremen to refrain from mowing or otherwise destroying patches of milkweeds found on the right of way, and to report the locations of these patches to the proper supervisory officer.

This is fine so far as it goes, but apparently few on the railways, including roadway maintenance officers, have given proper consideration to the hazard involved in the method of milkweed floss collection contemplated, which, according to the Hemp division of the Commodity Credit Corporation, will involve thousands of school children, including members of 4H clubs, Boy and Girl Scouts and other youth organizations, who are being approached to aid in this work. This is amazing in the light of the preeminence given to safety measures on the railways for many years. Still more amazing is the fact that the Safety departments on two roads questioned were not even aware of the plans that were already under way and, figuratively speaking, threw up their hands in fear of the consequences involved.

The policy to be pursued by the railways in this matter is not in the hands of track supervisory officers, but whatever that policy may turn out to be, if it permits and encourages children to enter upon the right of way, under any auspices or conditions, it will throw serious added responsibilities upon every track officer, including foremen, to see that tragedies do not occur.

Work Equipment—

Are Maintenance Facilities Adequate?

EMPHASIS has been placed from time to time on the benefits to be derived from power machines and other mechanical equipment where insufficient labor is available to carry on maintenance activities to the full extent demanded by present traffic. Experience has shown that this emphasis has not been misplaced or overdone, for many districts would be in far less favorable condition to handle the traffic that is now moving over them if they had been without such equipment to supplement the reduced forces that they have been compelled to work. Conversely, the task of the forces that have been employed has been far less burdensome because of the assistance given by the machines.

During the last three years labor has grown scarcer progressively and the need for mechanical equipment has increased correspondingly. Fortunately, the railways had a considerable amount of relatively new equipment in service when the labor shortage began to be felt and, equally fortunately, they have been able to buy a wide variety of machines and tools since then, although few roads have been able to meet all their requirements. In addition to this new and relatively new equipment, most roads also were in possession of older units, some of which were near the end of their service life. So great was the need for means to eke out the available labor, that even machines that would have been retired normally were retained in service, provided they could be worked safely. As a result, machines now in service range from new or practically new to a large number that have exceeded their normal life.

The units are being used intensively, and this is directing attention on numerous roads to the need for a better organization and a better system for their maintenance. Some of the faults of the present practices that have been uncovered by the urgent need for greater dependability of the equipment are too little supervision, lack of centralized supervision, dearth of qualified maintainers, inadequate and antiquated facilities for making repairs and no provision for frequent inspection by a trained mechanic, the inspection of the various units in some cases being left to the operator and the track supervisor.

The railways have upwards of $120,000,000 invested in work equipment, equal to that in 1,000 locomotives. What road operating 1,000 locomotives would be willing to leave their maintenance and repair to the loose and completely inadequate forces and facilities that are provided by some roads for the maintenance of work equipment? It is true that this amount of work equipment is not concentrated on a single road or even on a limited few. However, many roads now have power machines and tools that represent capital expenditures that range up to five million dollars.

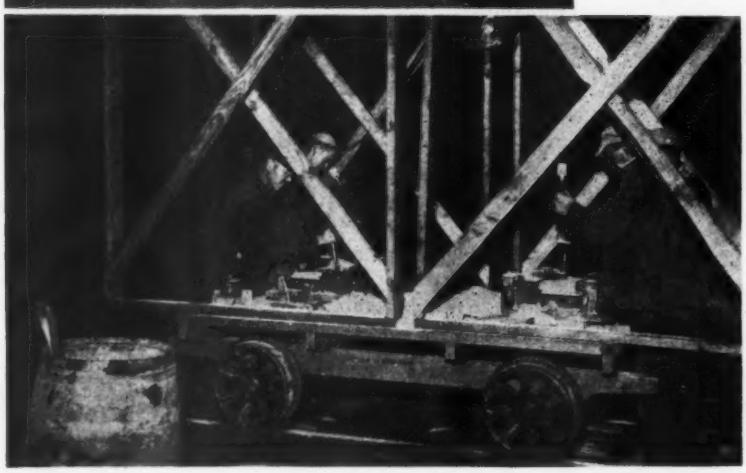
Any investment that is worth making is worth protecting to preserve it. This subject is of sufficient importance to warrant a complete review of the present practices with respect to the maintenance and repair of work equipment.

Erie Welds Otisville Tunnel Rails by Thermit

Using a new-type weld and doing the work in place, this road has connected the rails in the eastbound track in its mile-long Otisville tunnel into continuous lengths. This is the second field installation of the new weld, which incorporates a number of advantages as compared with previous types of Thermit welds. The characteristics of the weld and the manner in which it was installed in the tunnel are described herewith

The Rail Ends at This Joint, Having Been Lined Up by Means of the Clamps, Are Ready to Receive the Molds

Left — Each Mold Is in Two Parts. After Placing, Clamps Are Applied Top and Bottom to Hold the Mold in Position. Below—A Push Car Was Used as a Bench for Tamping the Molds



WHEN the Erie relaid the rail in the eastbound track of its double-track mile-long Otisville tunnel recently, it welded the new rail into continuous lengths with an improved-type Thermit weld, known as the full-fusion type. Only one previous field installation of the new weld has been made, namely, in the 6.25-mile, single-track Moffat tunnel on the Denver & Salt Lake, where the work of making the welds, which had been undertaken a year previously and discontinued during the winter, was finished during the fall of 1943. A significant difference between the two projects is that, whereas the rails to be installed in the Moffat tunnel were welded into 1,000-ft. lengths outside the tunnel and then drawn inside for laying, those for the Otisville tunnel were laid first and welded afterward. In fact, one of the aspects of the new weld is that it is so designed as to facilitate and simplify the welding of either new or old rails in track.

A product of exhaustive investigation and study, the new weld was developed by the Metal & Thermit Corporation with certain objectives in mind. Previous Thermit welds were comprised of a pressure butt-weld of the head area of the rails and a fusion weld of the web and base areas. Briefly, these welds were produced by cutting back the webs and bases of the abutting rails to produce a gap of ½ in., machining the head areas to smooth even surfaces, bringing the rails tightly together by means of clamps, placing a two-part sand mold around the joint, preheating the rail ends to a red heat, and introducing highly superheated molten metal produced by the Thermit reaction into the side of the mold from an overhead crucible. This metal flowed around the web and base areas, fusing with the rail metal and producing a collar of deposited metal around this section. At the same time, the molten slag (oxide of aluminum) produced by the Thermit reaction was surrounding the rail heads at their point of contact and bringing them to a welding heat. When this had been done, sufficient pressure was applied by heavy clamps, previously fastened

in Track Full-Fusion Process

to the rail ends, to cause the head areas to fuse together in a pressure weld, resulting in an upsetting action.

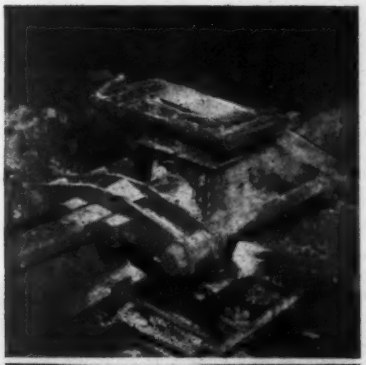
What Was Wanted

One of the objectives in developing the new-type Thermit weld was to obtain a weld that would have a more symmetrical and uniform collar of deposited metal which, also, would be devoid of the fin or nub of metal that, in the older type, projected from the collar on one side of the web at the location of the pouring gate in the weld. In other words, it was desired to avoid all irregularities in section that might conceivably result in stress concentrations or cause the joint to be vulnerable to damage under corrosive conditions.

Another basic objective was to obtain a weld that could be made more easily and quickly and at less cost than previous types of Thermit welds. A particular thought in this connection was that there was a definite need for a weld that would be simpler to make in track, in either new or old rail. When making continuous welds in track in existing rail with the older-type Thermit weld, it was necessary, because of the absorption of length due to the upsetting action, to open up the track to permit longitudinal adjustments of the rails, and also to permit the machining of the end faces. A further objective was the development of a "foolproof" weld that could be made with complete satisfaction by unskilled labor.

All of the foregoing factors were taken into consideration in developing the new weld. As already mentioned, this is a full-fusion weld, which means that the entire joint is made by fusing the rail ends together with Thermit metal, and no part of it is made by pressure. In other words, in preparing a pair of rail ends for welding, they are separated by a gap that is uniform throughout their cross-sectional area, amounting to ¾ in., and the weld is made by introducing molten Thermit metal into the gap under such conditions as to cause it to fuse with the parent metal in the two rail ends, filling the gap and at the same time forming a collar of metal entirely around the joint except at the head. As to the general procedure followed, the new weld is made in much the same manner as the older type, that is, after the rail ends have been brought into the proper alinement relative to each other, a two-part sand mold is applied, the rail ends are preheated and the molten Thermit metal is introduced into the mold from a crucible mounted above the joint.

There are, however, a number of important differences in the details of the procedure. For instance, since the new weld is a full-fusion type, it is possible to place the pouring gates directly at the top of the weld, i. e., over the head of the rail, instead of at the side of the web, as was formerly the case. Hence, not only is the new weld devoid of any irregular projections in the web area, but it has been possible to so design the molds that



Top—A Joint Being Preheated. Note Jet of Flame at Bottom of Mold. Second from Top—The Reaction Is Taking Place in This View and the Crucible Is About to Be Tapped. Right—Showing a Weld Immediately After Mold Was Removed. Below—The Running Surface at the Welds Was Shaped With a Precision Grinder

the rail section in the weld area is entirely symmetrical. Another difference is that, in preheating the rail ends for the new weld, a temperature range of several hundred degrees, i. e., from 1,700 deg. F. to 2,150 deg., is permissible, whereas in the pressure-fusion weld a higher degree of accuracy was required. This is said to be one of the differences that result that certain changes were made in the formula for the Thermit mixture to obtain a metal having the desired properties.

The Otisville tunnel is located on the Erie's double-track Graham line, a low-grade freight route that was constructed in Western New York in 1906-1908 to by-pass unfavorable grades on the road's New York-Chicago main line. Traffic over the freight line is extremely heavy, especially eastbound, which is the direction of the loaded movement. Severely corrosive conditions are present in the tunnel, which led the company to weld the rails in the eastbound track in 1936, the welds being made in new 131-lb. rail by the Thermit pressure-fusion process. Several years later, when new rail was installed in the westbound track, it was welded by the Sperry electric-flash method. Because of the combination of heavy traffic and corrosive conditions in the tunnel, the rail in the eastbound track is subjected to a high rate of wear, with the result that it became necessary to replace it in 1943. In making the renewal, it was decided to weld the new rail by the Thermit full-fusion process.

A Hand-Held Grinder Was Used to Shape the Sides of the Rail Head

contribute to the "foolproof" nature of the full-fusion weld.

Another point of difference is that in making the full-fusion weld, the facing or machining of the rail ends is not necessary; hence, one of the operations that characterized the pressure weld is eliminated, and the work of making the welds in track is simplified. When welding old rails without taking them out of track, the necessary ¾-in. gap at each joint may be formed by cutting back the rail ends with an oxy-acetylene torch, thereby avoiding the necessity of opening up the track to move the rails longitudinally. When making the pressure weld it was necessary to hold the rail ends together and in the proper alinement with a clamping device fitted with heavy screws, by means of which the rail ends could be brought together under sufficient pressure to complete the weld. Since there is no necessity for applying pressure when making the full-fusion weld, a lighter clamp has been designed for use with this weld, whose sole purpose is to facilitate the lining up of the rails and to hold them in that position.

When rail ends are joined by welds of the full-fushion type, it is apparent that the Thermit metal in the weld at the running surface of the rails is subjected to the full wheel action of passing equipment. This means that, to resist such wheel action, the weld metal must have essentially the same physical characteristics as the rails themselves. Close attention was given to this problem during the development work on the new weld, with the

Since the tunnel is located on an alternate route, there is considerable opportunity for rerouting traffic, and it was decided to take advantage of this situation by handling traffic in such a manner as to permit the welding work to be done in track without traffic interference. Under the arrangement that was worked out for doing the work, the welding operations were carried on each day from 12 noon to 10 p.m., the period of lightest traffic, and during this time all traffic was routed over the main line to by-pass the tunnel. This arrangement not only made it possible for the work to be done entirely without traffic interference, but it also had the further advantage of making the westbound track available at all times for handling the materials needed in carrying out the work.

During the remaining part of each 24-hour period, that is, from 10 p.m. to 12 noon the next day, traffic was single-tracked through the tunnel, and to implement this part of the arrangement certain temporary track changes were made to permit eastbound traffic to be diverted to the westbound track through the tunnel and then back again to the eastbound. These included the installation of a temporary crossover outside the east portal and the insertion of a temporary turnout in the westbound track outside the west portal where a section of the eastbound track was lined over to connect with the turnout. To obtain maximum efficiency in handling traffic under this arrangement, the turnout west of the tunnel and the east end of the crossover at the east portal were fitted with spring switches, and the existing block signals at the portals of the tunnel were relocated in such a manner as to govern the block between the two crossovers. Hence, it was possible for trains moving in either direction to pass through the tunnel without stopping unless the block was already occupied.

Laying the Rail

Preparatory to laying the new rail in the eastbound track, the old rail was removed by cutting it into lengths as long as 2,000 ft. and dragging them out of the tunnel with a locomotive. The new rail was then laid on the old tie plates, as it was felt that they would provide better support for the rail during the welding work, and hence, that their renewal should be postponed until after the welds had all been made. When laying the new rails, a ¾-in. gap was left at each joint, this being accomplished by the use of oak shims. These were formed, incidentally, by so notching oak sticks at intervals as to cause a piece of the desired length to break off easily when the end was interposed between the rail ends during the laying work. When the new rails were placed, only sufficient spikes were driven to hold them while the welding work was in progress.

In preparation for making the welds, the ballast at each joint was cleared away to a depth of about 6 in. below the base of rail, and, where necessary, the ties were shifted to provide a clear space about 2 ft. wide at each joint. Also, the rail ends at the joints were brought into approximate line and surface with each other. In this latter work, use was made of timber wedges which were driven under the rails to bring them up to the desired level.

The work of making the welds was

started at the easterly portal of the tunnel and carried forward progressively to the west end. It was performed by an organization of 25 men and a foreman, all of whom were regular track employees, except for two instructors who were furnished by the Metal & Thermit Corporation. None of the railroad employees had had any previous experience with welds of this type.

Details of Procedure

The first operation involved in making the welds was the application of the rail clamps, by means of which the rail ends at each joint are brought into exact alinement and held in that position while the weld is made. Six men were employed in this operation, two of whom were engaged in moving the flood lights that were used for illuminating the work, these being mounted on tripods. Next, four men, working in pairs, applied the molds to the joint and attached the mold-box clamps by means of which the two parts of each mold are held in position against the rail. Another function of these men was to lute or seal the mold boxes to the rail.

Incidentally, the molds are so designed that they each have an open dish-like depression at the top, known as the slag basin, in the bottom of which is a pouring cup, from which two pouring gates extend down into that portion of the mold that forms the joint. The purpose of the slag basin, as the name indicates, is to provide a place for the slag to accumulate that is formed by the Thermit reaction. It will be recalled that in the pressure-fusion weld the slag was used in helping to bring the heads of the rails to a welding heat, whereas in the full-fusion weld only the steel produced by the Thermit reaction is used in forming the weld, and the slag is a by-product.

Next in the welding organization was a group of four men who handled the work of preheating the rail ends and making the welds. These four men worked in pairs, and one of the men in each pair was an instructor furnished by the Metal & Thermit Corporation. The preheating is done, as formerly, by directing a jet of flame produced by a mixture of air and kerosene into the mold through an opening in one side of the base. Portable two-wheel pneumatic-tired machines are used for mixing the kerosene and air, and delivering the mixture to the molds, each of which incorporates a gasoline-engine driven blower and a storage tank for the kerosene. Two of these machines were used at Otisville, each of which is capable of preheating two joints simultaneously. The rail ends are heated until they become a cherry red, an operation that requires about 25 min. for each joint.

When a joint has been brought to the proper preheat temperature, the nozzle for the preheating jet is withdrawn from the mold and the heating gates and vents are plugged. A crucible is then placed in position over the mold, and a proper portion of Thermit is placed in it and ignited. When the reaction is completed, the crucible is tapped and the molten steel is allowed to flow into the pouring cup and thence through the two pouring gates into the lower part of the mold. The slag formed in the Thermit reaction passes from the crucible last and is retained in the slag basin. About 10 min. after the pour has been made, the mold boxes can be pried off for re-use, and the weld is ready for grinding.

A Finished Joint After Grinding

Grinding Operation

In the grinding operation, the running surface of the rail and the sides of the head at the weld are shaped to the contour of the parent rail section, using a precision grinder for the running surface, and a hand-held grinder operated by flexible shaft from a portable power plant for the sides of the head. On this job, two machines of each type were used, with two men on each surface grinder and one on each flexible-shaft unit, making a total of six men engaged in this work.

The welding organization also included four men engaged in making the molds. To permit the equipment to be moved forward as the welding progressed, the work of making the welds was performed on a push car, which was fitted with a canopy to protect the operations from seepage water falling from above. Finally, the organization included two men, who were engaged in hauling the materials needed in the work, such as molds and gasoline and kerosene, using a push car operating on the westbound track.

Following directly behind the welding organization, a track gang renewed the tie plates and replaced ties where necessary. Other work performed in the tunnel at the same time included the removal of all the old ballast from the eastbound track, its replacement with fresh ballast and the tamping of the ties with pneumatic tools, the track being given a slight raise on the new ballast.

Rate of Progress

In the welding work the personnel of the organization, which consisted (excepting for the two instructors) of unskilled railroad labor without previous experience in making welds, was quick to learn the procedure involved and to gain speed and proficiency in making the welds. This is shown by the fact that, whereas the output on the first day, when detailed instruction was given, was only 10 welds, it jumped to 22 the second day and to 27 the third day, and gradually increased until the maximum output of 42 welds in a single day was reached. The welding work included the making of a total of 286 welds and was completed in 10 working days.

During the last year or so the Erie has placed strong emphasis on the education of all its supervisors down to foremen and assistant foremen through the Job Instruction Training Course, and it is felt that the high rate of progress achieved on the welding work is largely attributable to the results of this training program. In organizing the gang from the road's regular track forces, the foreman and men were chosen with care in order to obtain those best fitted for the various tasks. Knowing that the men were entirely unfamiliar with the methods and equipment used in Thermit welding, it was necessary first to arouse their interest in the work and the various kinds of equipment which were to be used. The men were next told and shown how to carry out each operation. Since they were completely unfamiliar with the work and the equipment used, it was necessary to repeat each operation several times. The various men assigned to each task then performed the operation themselves, telling and showing how and why it was done in a particular manner. Several mistakes were made by the beginners during the learning period but these were corrected

(Continued on page 614)

Clean Camp Cars and Good Food Are Important in Reducing Turnover in Extra Gangs

Labor Turnover—What the

By J. P. Kiley
Assistant General Manager,
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In this address before the recent annual meeting of the American Association of Railroad Superintendents in Chicago, Mr. Kiley cites figures to show the serious turnover among railway employees, particularly in extra gangs, and tells of the measures that have been taken on his road to overcome it—including better and sympathetic supervision—more and improved labor camps, improved camp food, and continuous work programs

J. P. Kiley

UNTIL the start of the present war, our principal difficulty in labor turnover was in section and extra gangs, but since that time this problem has spread to many other departments. In fact, our problem now is twofold—that of recruiting enough employees to take care of our increased traffic, and that of reducing the turnover among new and old employees.

From January to December, 1942, the Milwaukee increased the number of its employees approximately 1,400—from 30,769 to 32,167. During that period we hired 26,980 new employees, so that, if we disregard the 1,400 additional employees hired, our turnover was more than 80 per cent. In 1943, between January and December, the number of employees was increased by 3,330—from 32,423 to 35,753. Deducting this increase from the 40,539 new employees hired in that period, our turnover was more than 110 per cent. It is evident, therefore, that we have not solved the turnover problem.

Because of the variation in employment figures from month to month, I prepared a statement to show the number of employees working, the new employees hired, and the ratio of the new employees hired to the total number working, which would indicate the turnover by months at a glance. This showed an interesting growth in the percentage of new employees, particularly during the period when our extra gangs were being built up to take care of their season's work. A similar statement for the year 1943 by months showed a general increase in the rate of turnover as compared with 1942. These percentage rates of turnover for the two years are shown in the accompanying table.

Probably the most important factor in labor turnover is working conditions, by which I mean practically every element involved in employment, with the exception of wage rates. It includes the ability of supervisors to handle their men properly so that serious friction is not created between them and the men, or between the men themselves. This is of prime importance, not only from the standpoint of labor turnover, but also from the standpoint of economical operation. A dissatisfied man does not turn out as large a volume of work as a satisfied man, nor does he turn out as good work. Supervisors who have the ability to keep men satisfied are an important asset in any railroad's organization. Other factors of prime importance in the proper handling of extra-gang labor are camp equipment and camp food.

We do not have statistics on our railroad that indicate turnover among all classes of employees. We do have, however, considerable information as to certain classes. For example, the number of our road brakemen at the middle of the month count does not vary widely from month to month. If we consider the number of these men whom we have hired in any particular period, we

Percentage Rate of Labor Turnover on the Milwaukee by Months, During 1942 and 1943

	1942	*1943*
January	5.42	8.00
February	3.15	7.83
March	3.93	9.45
April	7.76	11.38
May	7.07	10.15
June	8.30	14.71
July	7.41	10.53
August	7.89	9.62
September	9.38	9.09
October	7.93	8.55
November	6.28	7.65
December	5.70	7.07
Average	6.76	9.55

Milwaukee Is Doing To Reduce It to a Minimum

get a pretty good picture of the turnover among them in that period, even though that turnover may in most cases result largely from losses to the armed forces. In the twelve months ending May 1, 1944, we hired a total of 509 brakemen, which, on the basis of the average number of employees during the year, represents a turnover of slightly more than 2 per cent per month. Taking into consideration the fact that the men in this category have been generally among the type most desirable for the armed forces, that figure does not appear to be excessive.

In firemen, under similar circumstances, we had a turnover of about 2.4 per cent per month; in switchmen, about 2 per cent per month; and in telegraphers, only 1 per cent per month. When you take into consideration the fact that during 1943 our average turnover among all employees was in excess of 9 per cent a month, the turnover in our transportation services does not appear to be unduly high.

Where men have worked long enough to obtain considerable seniority, our problem of labor turnover has been relatively unimportant, except to the extent that these men have been taken by the armed services; and while the seniority provisions of our various labor schedules were incorporated primarily as a protection to employees and are, of course, of definite value to them, they have also been of substantial value to the railroads as a whole during the period of this war, because employees who have many years of service have a very definite stake in those seniority provisions and, as a result, have remained with us. This has been of special value to the railroads as it pertains to these occupations that require long periods of training or apprenticeship in order to learn them properly.

Our principal difficulty in labor turnover has been in extra gangs and among the type of labor that is associated with such gangs. In 1942, during the working season from May 1 to October 15, we had an average of 2,051 men in extra-gang camps. Within that period we had 10,103 men quit for various reasons, but 8,503 of these men rehired at our camps after they had had their vacations, so that we hired only 1,620 new men during this entire period. This means that during this period of 5½ months we had a labor turnover of about 14.5 per cent per month.

We have statistics for short periods in 1944 which show that within a period of six weeks, with an average employment in extra gangs of approximately 920 men, we hired a total of 1,098 men, which indicates a monthly turnover of about 80 per cent.

Until 1942 we were fairly proud of our record of handling our extra gangs and the relatively small turnover we had as compared with that being experienced on certain other roads. We ascribed our success to the two important factors that I have already mentioned. Our general foremen in charge of large gangs have been selected with an eye to their ability to hold their men, as well as to turn out satisfactory work economically. Over the years, these men have developed a substantial following among the men that work in extra gangs year after year. In the off-work season our general foremen are used as roadmasters or section foremen on territories near their homes. The statistics, which show that 84 per cent of the total number of men who quit were rehired, indicate to me that most of our men are satisfied to work with and for us.

With the type of men that we must employ in extra gangs, it is inevitable that we will have a large percentage of quits, because these men apparently feel certain obligations to consume a part of the output of our distilleries, and must take vacations periodically to fulfill those

Careful Supervision and Attention to Safe Working Practices Are Essential in Handling the Labor Available Today

obligations. But the fact that they come back to us repeatedly indicates that they like the treatment they receive from us.

Improved Camp Facilities

In 1929, when retiring substantial numbers of passenger train cars, we started a program of providing better camp cars, converting these released cars into camp equipment. We also began including improvements which, in our opinion, have played quite a part in enabling us to obtain a better class of extra-gang labor. These improvements have included running water in every bunk car, electric lights in all cars, and electric current in kitchen cars for the operation of various electrical kitchen devices, which insure the better preparation of food. They also include shower bath cars with hot and cold running water, which are also equipped with laundry tubs where apparel can be washed; toilet cars, which avoid complaints from communities, as well as provide better facilities for the men; and numerous other minor improvements, all in the interest of keeping our men satisfied and willing to continue to work for us.

We have also exercised careful control over the quality of food purchased for our camps, and in its preparation and the amount served to the men. While the old saying, "The way to a man's heart is through his stomach," is applied more commonly to the affairs of Dan Cupid, we believe that it also applies to workmen, and that the way to get a man to utilize his strength is to provide him with satisfactory fuel to renew that strength.

Because of the success that we have had in recruiting and maintaining our extra gangs, we took much the same measures in recruiting and maintaining a force at our Galewood freight house in Chicago. In the summer of 1942 we became desperate for labor at that point. Here, we had a force of relatively young men, upon which the demands of the military made serious inroads, and we were unable to recruit replacements because of the competition of other war industries. If we were to go to the type of labor that we have been employing successfully in extra gangs, it was recognized that it would be necessary for us to provide this labor with adequate housing and proper food. This we have done, and while we do not have an economical operation at our freight house now as compared with former years, we are handling our freight currently and expect to be able to continue to do so from this time on.

In addition to the housing facilities that we have constructed at our Galewood freight house, we have also provided housing and boarding facilities for transient labor at our principal engine terminals, so that we can secure and hold the necessary common labor, including coaling station laborers, enginehouse laborers, and shop and storehouse laborers, required in connection with the operation of these terminals.

Winter Employment

During the last two years we have maintained our extra gangs through the winter in order to be able to carry on our rail relay work when weather permitted, and to have these gangs available for emergency work, such as clearing snow, when it was impossible to secure laborers at our terminal points to do this work. In some cases we found it necessary to move camps from the line into terminals until an emergency had passed, and then to move them back out onto the line to continue the rail relay work. This is not an economical procedure in normal times, but we must do many things in war time which are not considered the most practicable or efficient under normal conditions.

Manpower continues to be the bottleneck on our railroad, as I think it is on every other railroad. Labor turnover has a very serious effect upon the efficiency with which work can be carried out, so that we feel that anything that we can do to minimize it, regardless of cost, is the proper thing to do under the circumstances, provided it helps us obtain a more satisfied group of workmen and better performance.

Erie Welds Tunnel Rails in Track

(Continued from page 611)

readily. The men were then allowed to carry out the work themselves, being checked frequently to determine that they were doing it correctly.

The results of another training course, Job Methods Training, also practiced on this railroad, were likewise in evidence on this job as the work progressed. For instance, the lining and surfacing of the rail ends before welding, an operation that must be done with accuracy to insure the quality of the weld, was accomplished by the use of wooden wedges in preparation for applying the clamps. These were tapped gently under the rail on each side to remove any sags in the surface, and they were also inserted under the rail from either one side or the other to bring the rail ends perfectly erect and in the proper alinement. This facilitated the application of the rail clamps, with the result that the same few men lining the rail ends with wooden wedges also applied the rail clamps.

After the various small groups of men become proficient in the particular operations in which they were engaged, it was found difficult to make sufficient molds to keep ahead of the preheaters with the number of patterns on hand. This was overcome by working another shift outside the tunnel during the hours when trains were allowed the use of the tunnel. Thus a sufficient number of molds was made to enable the regular shift of mold tampers to keep ahead during the ten hours the tunnel was out of service. During this double shift, it was necessary to regulate the supply of molding sand at the location required. The mold-making operation had to be very exact and could not be rushed. For this reason, the men were chosen for this operation with particular care, and to prevent a slow down of the work due to absenteeism, two extra men were instructed in the operation of making molds, so that the balanced organization was always kept intact.

It was found that the work involved in this undertaking gave excellent opportunities for the practice of Job Instruction Training and Job Methods Training. The results were manifested both in the speed of the work and the smoothness with which the various operations were carried out, especially in view of the fact that the atmospheric conditions in the tunnel were extremely difficult. Not only was each individual operation analyzed, but the entire operation was so timed that as the welders reached the west portal, the other track work, including the tie renewals, the ballasting, the tamping, and the spiking, was also being brought to completion. Practically as soon as the last weld was made and the equipment loaded, the track was ready for operation.

This project was carried out under the general direction of the I. H. Schram, then engineer maintenance of way of the Eastern district and now chief engineer maintenance of way of the system, and H. J. Weccheider, division engineer of the New York division. It was under the direct supervision of H. S. Trenholm, track supervisor. The Metal & Thermit Corporation was represented on the job by Donald C. Dickson, superintendent.

Maintaining Water Service Facilities—

Well-Supported Suction Lines Are Essential to Uninterrupted Service

Pollution of Wells— Intakes, Suction Lines, Pump Pits, Ice

By C. R. Knowles

Superintendent Water Service (Retired)
Illinois Central, Chicago

No. 4 of a Series

This article explains the causes of pollution of wells and describes methods of sterilization. It also discusses the maintenance of intakes, suction lines and pump pits and the troubles frequently encountered with various types of ice. This completes that part of the series dealing with natural sources of supply and wells. The next article will begin the discussion of pumps for water service

EVERY precaution should be taken to prevent pollution of wells, as affecting quality of water for both boiler use and for human consumption. The top of the casing should extend above the floor or ground whenever possible. It should also be sealed to prevent surface water or foreign matter from entering the well. The casing should also be sealed on the outside, with the seal carried down sufficiently far to prevent water from seeping into the well around the casing; this precaution is particularly important with shallow wells. The floor of the pump house should slope away from the well to prevent water from collecting around the casing.

Coal or cinders should not be stored in the vicinity of a shallow well or where the drainage therefrom will flow near the well. The gravel under and adjacent to piles of cinders will become saturated with objectionable chemicals, which through seepage, may affect the quality of the water and even render it unfit for boiler use. Instances are not uncommon where coal mine drainage and water from cinders have not only changed the character of the water in a well and stream, but have rendered it unfit for use.

Trouble is experienced sometimes from pollution of the water supply where the water is drawn from a water-bearing rock formation that is located beneath an unconsolidated formation, even where the well is cased to the rock, and the lower end of the casing rests upon the rock and is depended upon to form a seal and prevent pollution by the water from the overlying strata. This seal often leaks, permitting water of an undesirable character to enter the well. This can be remedied in most cases by pumping neat cement around the casing, working from the bottom up.

Where water from a well is used for human consumption, the well should be thoroughly disinfected or sterilized with chlorinated lime (calcium hypochlorite) after any repair work is done, or after any part of the pumping equipment comes in contact with the water. The best method of preparing and applying the disinfectant is to mix five pounds of the chlorinated lime to a thin paste in a 2½ or 3 gal. pail, add clear water to this paste until the pail is filled, stir thoroughly and allow it to stand until the insoluble material has settled to the bottom, then pour the clear liquid, which contains the chlorine, into a 50-gal. barrel or drum, and finish filling the barrel with clear water.

In treating a well with the droplines in place, the solution is introduced through the annular space between the casing and the dropline. For other types of wells the solution may be poured or siphoned directly into the well. The chlorine solution should be followed by sufficient water to mix the sterilizing solution thoroughly with the water in the well and to force it to the bottom by the displacement of the water in the well. The well should not be pumped for four to six hours, after which the water should be pumped and wasted until no trace of chlorine is present. This can be determined by the orthotolidine test for residual chlorine, or if no testing outfit is available, until no odor or taste of chlorine remains in the water.

This dosage should be satisfactory for wells up to eight inches in di-

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ameter. For larger wells, ten pounds of chlorinated lime should be used, following the same procedure.

The quantities mentioned above apply to ordinary commercial chlorinated lime which contains about 25 per cent available chlorine, and which may be obtained from most local drug stores or from any wholesale chemical supply house. High-test chlorinated lime, which contains about 65 per cent available chlorine and may be obtained in some places, is more convenient and reliable, if available. It is used in the same manner as ordinary chlorinated lime but requires only one-half to one-third as much to be effective.

General

Open or dug wells require little maintenance other than cleaning and repair of the curbing. They are supplied chiefly from seepage and superficial sand or gravel areas, and are more subject to pollution from surface wastes than deeper wells; therefore, every precaution should be taken to prevent waste water from entering them. There is always a tendency for them to fill with fine sand from the incoming water, which decreases their yield as well as their storage capacity. They should, therefore, be cleaned as often as required. A clamshell bucket is adapted to this work as it does not require holding the water level down, as where hoists and buckets are employed. Where timber curbing is used, it should be well maintained to avoid the possibility of caving, as well as the pollution of the water. Dug wells should be covered as a measure of safety and to prevent the growth of vegetable organisms, which sometimes proves troublesome.

Drive point wells are adapted to relatively shallow water-bearing formations, and are used chiefly for stock-yard, station and section house supplies, where the water requirements are not large, although in some instances batteries of several drive point wells have been installed to furnish supplies for locomotives where conditions are favorable. The maintenance of such wells consists of pulling the wells and cleaning or replacing the drive points; in most cases the latter proves most satisfactory and economical.

In the past it has been more or less general practice to allow the excess water from flowing wells to waste, this practice being based largely on the fear that stopping the flow would cause the well to fill with sand. Practice has shown, however, that flowing wells will have longer life and give less trouble if the flow is controlled than where they are permitted to flow constantly, for the continuous flow enlarges the screen openings, permitting fine sand to pass through. Controlling the flow is also a measure of conservation, in view of the alarming extent to which ground water levels have lowered in many areas. The flow can be controlled by a float valve in the same manner as with a pumped or city supply. The float valve should be of the slow-closing type to prevent water hammer or surging in the well.

There has been much discussion with regard to the life of wells, but so many factors enter in that it is impossible to make an intelligent estimate. A well drilled in rock has an indefinite life for there is nothing to corrode or wear out, while the life of a cased well is governed largely by that of the casing and screen. There are records of cased wells that are still in service after more than 40 years, and of other wells of similar construction that have failed after 5 to 10 years. The chief factors determining the life of a well are the care and maintenance given it. If it is properly constructed and given timely attention, it should last as long as the casing. Many wells have been abandoned as useless, which timely repairs and proper methods of reconstruction would have maintained in useful service.

Intakes

The term "intake," as generally used, includes any or all of the facilities used in the delivery of water from the source of supply to the pumps. Its purpose is to provide an uninterrupted supply, and, so far as possible, prevent objectionable matter carried by the water from entering the suction line and interfering with the pump operation.

Material carried by the water, that affects the operation of the pumps and the quality of the water, may be divided into two general classes, (a) that having a specific gravity greater than water, and (b) that having practically the same or a lower specific gravity than water,—in other words, material which will sink to the bottom and that which will float or remain in suspension. The first classification includes mud, sand, gravel; the second includes fish, leaves, sticks and twigs, as well as certain forms of cinders. Those included in the first group can usually be eliminated by means of settling basins of proper design; screens are required to exclude the latter group.

In streams and other sources of supply where the water carries a great deal of silt, mud and fine sand, it is advisable to provide an intake well or sump with two or more compartments, by means of which the water can be brought to rest in the first or intake compartment where the heavier matter is allowed to settle out before it passes into the second or suction compartment, thus depositing a large part of the matter in suspension. The partition between the two compartments should be provided with a screen to hold back floating material. Each compartment should be of ample size to allow the heavier matter to settle out of the water.

The screens between the two compartments should be of sufficient area to reduce the velocity of the water passing through them to such an extent that leaves and other floating material will not form a mat and clog the screen. The intake lines should be located well above the bed of the stream to escape the heavier matter carried on the bottom. Intakes lines should be large enough to permit a low velocity through them. The approximate velocity required to move fine clay and silt on the bottom of a flume or pipe is 15 ft. per minute, fine sand 30 ft. per minute, and gravel or pebbles of ½ in to ¾ in. diameter, from 60 to 90 ft. per minute. It is advisable to provide some means for closing the intake line while cleaning the sump; this is usually done by placing a gate valve or sluice gate in the intake line.

Correctly-designed intakes give little trouble when properly maintained. The removal of deposits currently as formed is of first importance, the periods between cleaning depending, of course, on the amount of material deposited. It is a good rule to clean intakes before and after flood periods. Intake maintenance is largely a matter of preparedness. Possible trouble should be foreseen and precautionary measures taken to prevent difficulties in operation, rather than waiting until they occur to correct them.

Suction Lines

Suction lines should be maintained to a uniform grade descending from the pumps, to prevent the entrapment of air. This is of special importance where centrifugal pumps are used, for they will not operate properly if any air is present in the suction line. The end of the suction line should be supported in such a manner that it is held off the bottom of the stream; at the same time

it should be submerged sufficiently to prevent air being drawn into the pump. In very shallow streams, it is sometimes the practice to increase the size of the suction opening to reduce the velocity of the water as it enters the suction line, thus decreasing the possibility of air being drawn in.

Even under the most favorable conditions, leaves, twigs, fish and small animals may enter the suction line if it is not screened; therefore, it is advisable to screen all suction intakes. These screens should be kept in good condition and cleaned as often as necessary. Where no foot valve is used, as for example on displacement pumps where the lift is very low, pressure from the tank may be used for flushing out the suction line and cleaning the screen by placing a by-pass line around the pump. This is not always desirable, however, for it interrupts the operation of the pumps, and sometimes requires a great deal of water. Trouble is sometimes experienced also from sand carried by the water of streams. Where the bed of the stream is composed of coarse sand and gravel and there is little mud or silt, a fine strainer, such as a well screen, may be placed on the end of the suction line with good results.

Foot valves are always desirable on suction lines, even where the lift is low. They are essential to the operation of centrifugal pumps and facilitate the priming of displacement pumps. They should have ample area to prevent undue friction through them. Check valves are sometimes used as foot valves but a standard foot valve is to be preferred. If it is necessary to use a check valve, it should be of the swinging gate or vertical type, and large enough to avoid excessive friction. Foot valves should be tested or examined at regular intervals to see that they are seating properly; worn or damaged seats should be repaired or renewed.

In some cases, where streams are subject to a moderate variation in water levels, a floating suction line is used, the foot valve and strainer being supported by oil drums or barrels. This permits the intake facilities to rise and fall with the varying water levels. An intake of this kind is not suitable where any great amount of driftwood or floating ice is carried by the stream and is generally used only with temporary stations or in emergency. As a rule, the end of the suction pipe is provided with an elbow to permit the foot valve to swing in a vertical position. If the elbow is submerged, it may be left slightly loose on the threaded end of the horizontal line, so that the foot valve and screen may be lifted out of the water readily for examination or repairs.

Exposed suction lines should either be drained when not in use or protected against freezing. A simple method of providing an automatic drain is to drill a 1/8-in. hole in the line below the water level, and just above the foot valve, for the waste of water through such a small opening will not interfere with priming the pump. Furthermore, the hole may be plugged during the summer, or if preferred, a small pet cock may be used.

Pump Pits Are Required Where Streams Are Subject to Varying Stages of Water

Pump Pits

Where there is a wide variation between high and low water, the pumps are usually placed in deep pits, to enable them to lift the water at the lowest stage. Pump pits should be kept dry and clean. In some cases auxiliary pumps are installed to remove seep water, leakage, and waste water from the pumps. These auxiliary pumps should receive careful attention to insure their efficiency.

Cleanliness is important to pump pits, as it is difficult to keep pumps in good operating condition in a dirty pit. Duckboards should be placed on the floor to enable pumpers and repairmen to keep their feet dry when packing, oiling or repairing pumps. These duckboards should be removable to permit them to be taken up and cleaned, as well as to facilitate cleaning the floor of the pit.

Reciprocating steam pumps should be wiped daily to remove dirt and surplus oil. Automatic electric pumps are less subject to dirt than steam pumps, but it is even more important that they are kept clean and dry. Provisions should be made for good lighting, which is essential when making repairs or packing the pumps. Good lighting also tends to promote cleanliness. The pits should be provided with adequate ventilation. This is important especially where internal combustion engines are used to drive the pumps, for gases from fuel oil or gasoline may accumulate in the pit and create a serious hazard from explosion or fire. Stairways and ladders in the pit should be maintained in safe condition at all times.

Ice

Not the least of the troubles encountered in maintaining intakes in streams and lakes are caused by ice in various forms. Ice formations that cause trouble in intakes and suction lines may be grouped under three general classifications: surface ice; anchor ice, which forms on the bed or bottom; and frazil ice, which forms between the bottom and the surface.

Surface ice rarely causes any trouble unless it freezes to a sufficient depth to interfere with the flow of water to the intake, or is broken up by winds or thawing. It constitutes a protection against anchor ice, for the latter will not form under surface ice.

Anchor ice, sometimes called ground ice, forms only in a running stream or where the water is in motion, when the temperature is very near or below zero and the night is clear. It does not form under surface ice or during cloudy weather. It forms near the bottom and attaches itself to rocks, pipe lines or other hard substances. It becomes loose as the sun rises, or the temperature increases. Anchor ice will form on screens and in suction and intake lines, small particles attaching themselves to the screen and pipe and then to each

(Continued on page 620)

Adapting Salvaged Steel Presents Special Problems

By R. N. Brodie
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THE adaptation of salvaged steel presents some special problems which, although simple in themselves, can lead to troublesome results if they are not treated adequately. The nature of this work will, however, permit the establishment of more or less routine procedure. I speak now from the viewpoint of more than one year's experience in planning and executing repairs to steel bridges which have been made almost exclusively with reclaimed material.

Obviously, the first requisite for a program of this kind, particularly if it is of considerable magnitude, is a large structural-steel scrap yard containing a representative assortment of steel shapes in fairly good condition. When released material is received at a central depot, as it is on most railways, it should be sorted into several classes, the following divisions being suggested: 1. That which can be reused as received; 2. That which can be reclaimed, but must be worked over; and 3. That which is damaged, too-far gone or obviously otherwise unsuitable for reuse. The latter should be scrapped at once.

If the material can be segregated in this manner upon receipt at the storage yard, much time will be saved subsequently in locating shapes that may be desired. This preliminary sorting also tends to increase the percentage of reclaimed material, as the personnel becomes more familiar with the definite categories on hand.

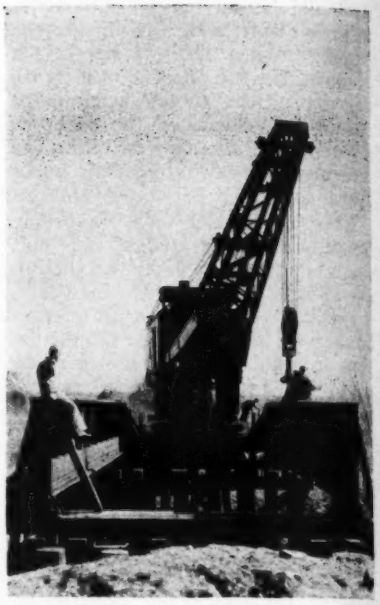
Dismantle at Once

When an entire structure is received at the dock of the storage yard for disposal, it should be dismantled by cutting all rivets, not by burning apart in a haphazard manner, unless the steel is obviously too-far deteriorated for reuse. While apparently expensive, this manner of handling will result in a better selection of usable material.

Assuming that a supply of second-hand steel has been made available, the initial approach to the problems of adaptation is on the mental side. True conservation of new steel requires that all who may be concerned in any way with the project adopt a new attitude toward material supplies, which may be summarized thus: order no new steel until every effort has been made to use salvaged steel. I mention this particularly because there may be a tendency at first to take the opposite approach, until the use of reclaimed steel has been demonstrated to be a success.

To achieve the best results, the designers of steel repairs should keep in close touch with the current salvage situation, and by frequent surveys should maintain an approximate knowledge of what shapes and weights are available. This will avoid considerable delay created by revisions of plans to accommodate necessary substitutions. Because of fluctuations and an excessive variety of scrap shipments, recourse to the usual system of stock lists usually will be found to be impracticable. Competition between departments will also cause rapid changes in available stocks, while materials remain in such demand.

There is no more important feature in the use of reclaimed structural steel than the maintenance of strict inspection standards. Steel that has been selected for use should be inspected rigidly for small cracks that may have developed in service; and for damage that may have been received in dismantling. Again, the type and function of the member to be renewed must be considered when deciding on what constitutes cause for rejection. Evidence or knowledge of previous service, such as that of parts subjected to long periods of reversed or repeated stress, will all contribute to the choice of the material. It may be good judgment at times to order new material for vital parts that are to be subjected to heavy service. A case in point is that of the main center-connection angles of a twin-span turntable. These should not be renewed with old steel; neither should the old angles be used again in an important stress-carrying member. There is, however, a large proportion of repairs which will not require such refinements of selection.



Abandoned Steel Bridge Spans Are Frequently Salvaged for Service Elsewhere By Strengthening Them, or By Refabricating Them Into Spans of Shorter Length

What to Do With Holes

In the reuse of structural steel, disposal of unwanted holes is a problem of most frequent occurrence. In this matter, some fairly definite practices may be established, as is indicated by the following rules, which have been tested in actual use:

Economy requires that we refrain from plug-welding holes, except when open holes will become a detriment to the structure. Experience enables us to lay down a few general principles which should be followed in planning, fabricating and inspecting repair work.

Holes should be plug-welded solidly, in a manner to restore the metal, as nearly as possible, when: 1. They interfere with new connections; 2. They reduce the strength of the member by a relatively large percentage, as, for example, 15/16 in. holes in both legs of a small angle; and 3. They are called for on the plans.

Holes should not be plugged when: 1. They occur in one leg of a secondary member, such as a bracing angle, and are spaced at least 6 in., or 12 times the thickness of the material; 2. They are in areas of girder webs not used for connections; 3. They merely detract from the appearance of the finished work; and 4. They occur in any available mate-

rial, of which the net area has been checked and approved by the draftsman who designed the repairs involved.

In general, the best material with the fewest holes should be selected, but if solid material cannot be found, the draftsman should be made responsible for checking what is actually used. If the material must be free from holes, this will be noted on the plans and in the bill of material. When holes must be plugged merely for tightness, as in a hopper plate, punchings may be inserted in the holes and seal-welded in position. If a large group or a long line of holes occurs, a patch plate can often be placed over them and either welded or riveted, whichever is the most suitable.

When holes are near a new connection, they should be plug-welded, and the surface ground flush before new holes are drilled. Where there is any doubt about the correct procedure, special instructions should be obtained from the engineer of structures. When we are faced with a repair-at-any-price situation, the question of the relative economy of plug-welding holes becomes of small importance. Experience indicates, however, that in the long run, the cost of fabrication is not greatly increased by this particular item.

When a Contractor Does It

Up to this point it has been assumed that the fabrication is to be done with company forces. However, if it is to be done by outside concerns, the same general rules can be followed. Salvaged steel can be supplied to the fabricator, either in its original condition or after some working over. This, obviously, is a matter for special local arrangement. The exigencies of the particular situation will dictate the best combination of facilities required to get the work done.

One of the outstanding hazards of using salvaged steel lies in substituting different sizes and shapes for those to be replaced. Existing details must be checked carefully to insure that the sections available, if not identical, can be erected without interference, and that they provide the required net section. If these points are investigated thoroughly, it will be found that many expedients can be adopted to overcome a shortage of the sizes and shapes required.

It is scarcely possible to derive the maximum benefit from salvaged steel without employing welding to some extent. Freedom to combine flame cutting, welding and riveting, as may be found necessary or desirable, will greatly extend the scope of operations required to keep bridges going for the duration. Finally, the successful use of salvaged steel requires maximum contributions of ingenuity and resourcefulness by every one engaged in the operation, in addition, and a constant awareness on his part of the urgent need to "keep 'em rolling."

How to Get the Most Out of Your Portable Air Compressor*

NOTHING is more important to the war effort than proper maintenance of equipment. In the operation and care of portable air compressors, proper maintenance and attention to operating details will insure long life and highest efficiency. Probably the best two suggestions which can be made to insure a long and trouble free life for a compressor unit are, first, to assign a specific individual to be responsible for the operation of the machine and, second, to have that man read and study the manufacturer's instruction book carefully before attempting to start the unit.

While portable compressors usually undergo a "break in" run at the factory, it is not advisable to start a new machine working against full load immediately, because most units are slushed with heavy oil when the factory test is completed to prevent rust and corrosion while they are stored before being put into service. A good run on the engine, without any compressor load, will clear out this oil and help prevent the fouling of spark plugs and the gumming of piston rings. Another run, with all the compressor discharge and cooler valves open, will prevent the corbonizing of compressor valves and will assist in maintaining a high compression efficiency.

Proper lubrication, as with any reciprocating machine, is vital. Be sure that the correct grade of a high quality lubricating oil is used and that the manufacturer's instructions relative to quality of oil and frequency of changes are followed, for nothing is as destructive to a machine as poor lubrication.

Portable compressors operate frequently in dusty locations where the air is laden with grit and dirt which can be most harmful. For this reason, adequate air cleaners are always supplied on both the compressor and engine inlets. The operator should follow the printed instructions on servicing the air cleaners, which should be checked frequently. A dirty air filter on the engine will cut down its power and increase its fuel consumption, while clogged air filters on the compressor inlets will reduce the capacity of the machine and make it run hot.

Similarly, most machines have oil filters and the frequent and regular servicing of these filters will help insure adequate lubrication, and prevent costly breakdowns.

Keep the machine tightened up. A portable compressor, even when towed at no more than the recommended speed, will frequently be-

* Abstract of an article prepared by the Educational Committee, Compressed Air Institute, Cleveland, Ohio.

"Proper Maintenance and Attention to Operating Details Will Insure Long Life and Highest Compressor Efficiency

come loose. Trace down any rattle and be sure that all the nuts and studs are tight. To minimize this possible source of trouble, use reasonable towing speeds;—for example, if the unit is steel-wheel mounted, keep under 10 mph.; if mounted on rubber tires, without springs, under 15 mph., and if mounted on pneumatic tires, with springs, under 30 mph.

Keep Machines Clean

Keeping the machine clean saves money. If rust spots show anywhere, touch them up, for if they are not attended to they may corrode through and cause trouble. Wash the unit once in a while. It will look better, the mechanics will take better care of it and, in addition, the washing will clean off heat transfer surfaces, such as radiators, cooling fans, etc., which will help to maintain the original efficiency of the whole unit.

When service is required, if the operator does not know how to make an adjustment, he should call a field representative and let him show what is required. It will be cheapest in the long run to get the job done right. If service isn't available, read the instruction book carefully before undertaking even the simplest job. One wrong adjustment might ruin the machine's performance.

When the compressor is stored, drain the cooling water, flush the cooling system, and put in a good rust inhibitor. Drain and flush the crank cases and slush the machine with a good rustproof lubricant. Drain all tanks and paint exposed finished surfaces with a dried grease. Do these things and it will be ready for use when it is next needed.

Give your compressor reasonable attention and care and you will get full value from the investment.

Track Spike on Rail Throws Freight Train Off Track

IN the derailment of a freight train on the Kansas City Southern, near Hornbeck, La., on April 6, one employee was killed and two were injured. Second 92, northbound, the train involved in the accident, consisted of the locomotive, one auxiliary water car, two cabooses, 68 cars and a caboose, in the order named, and was moving at an estimated speed of 25 miles an hour when it was derailed on a 3-deg. curve.

In its report on the accident, from which this information is abstracted, the Interstate Commerce Commission stated that while moving around the 3-deg. curve, the engine-truck wheels were derailed to the left, the high side of the curve, and continued in line with the track for 2,337 ft. to the frog at the south end of a passing siding, where the general derailment took place. The locomotive came to rest 268 ft. north of the switch, upright and in line with the track and with the tender coupled. Besides the locomotive, seven cars were derailed.

Examination of the track after the accident disclosed wheel-flange marks on the ties outside the high rail and inside the low rail from the point of derailment, which occurred 972 ft. south of the north end of the curve, to the frog of the turnout. From the frog to where the locomotive stopped, the track was torn up. A track spike was found on the ballast about 2 in. outside the base of the high rail about 10 ft. south of the first evidence of flange marks. The hook of the head was pressed down against the shank, and the back of the head and the shank bore new abrasive marks.

Immediately south of the point where the spike was found, an abrasive mark appeared on the running surface of the head of the high rail. This mark extended from the center of the head to the outside edge, and was about 3 ft. long. These marks indicated that prior to the accident, the spike had been placed longitudinally on the rail, with the head to the south and the hook upward, and that the spike caused the left wheel of the engine truck to be raised high enough to allow the flange to cross the head of the high rail.

No direct evidence was adduced as to who had placed the spike on the rail, but it was believed that a child who had been seen in the vicinity a short time before the accident, had done so. The investigation did disclose, however, that a considerable quantity of scrap track fastenings had been left in the vicinity about two months earlier, by an extra gang that had worked in the vicinity, and that this scrap had not been picked up.

The rules of the maintenance-of-way department of this road provide that released track material must be collected daily by the track forces. The section foreman admitted that he was familiar with this requirement, but said that his forces had been engaged in other important duties and had been unable to devote time to picking up track material in this vicinity. The roadmaster said that he had made frequent trips over this territory, but had not observed the track fastenings.

Maintaining Water Service Facilities

(Continued from page 617)

other with great rapidity, until the openings are closed. It is almost impossible to remove anchor ice by bars or poles. Small charges of dynamite or other explosives are sometimes used to dislodge it. Steam jets are also used to prevent its formation. The most effective method of protecting against anchor ice is to locate the intake in quiet water or to create a zone of quiet water by driving piling or sheeting.

Frazil ice forms only in swift water where surface ice cannot form. As with anchor ice it forms most rapidly on a clear, cold night or on a dark, windy day. It is crystalline in form and sometimes very hard. When it is forced or pulled into an intake, it will fill the pipe line, and shut out the water. Relief from frazil ice may sometimes be obtained by reversing the flow of water through the intake pipe but the most satisfactory procedure is the same as with anchor ice.

Still another form of ice, often incorrectly referred to as anchor or frazil ice, is slush ice, which may be a combination of frazil and anchor ice mixed with snow and broken surface ice. It may behave in the same manner as anchor or frazil ice in stopping the flow of water in an intake or suction line. It is more easily handled, however, as it is usually present only when the temperature is high enough to prevent its freezing into a solid mass. It forms on the surface and is controlled by keeping it away from the intake by means of sheeting or surface baffles.

Some New Developments in Maintenance Materials*

By C. B. Bryant
Asst. to Vice-President
Southern
Alexandria, Va.

UNDER normal peacetime conditions, the railroads consume about one-fifth of the total production of steel in the United States. This represents a tremendous expenditure, and if there is any means by which that expense may be reduced and the life of our steel products increased, we must adopt it. It has been estimated that a million tons of steel are lost by corrosive action each year and that a large part of this loss occurs on the railroads. As we look ahead into the post-war period, we are seeking for means of reducing that loss. Some of the new metals, particularly aluminum, may provide an answer to part of that problem for under most conditions aluminum is non-corrosive.

Steel itself may be rendered relatively non-corrosive by various alloy additions. These do not prevent rusting entirely but they greatly retard it and low-alloy steels are now available that have a corrosion life several times that of ordinary carbon steel. However, regardless of what we may do in substituting non-corroding or slowly-corroding steel, unquestionably our major use of steel products in the future will continue to be in the form of ordinary carbon steel which requires some form of protective coating. This means paints. The paint industry is changing rapidly with respect to the types of materials used. The plastics industry has developed a large variety of synthetic resins which, when incorporated into paints, improve their durability and protective action in a major way. We are not yet able to use many of the synthetic resins that we know about because of military priorities, but it seems certain that after the war these resins will be used largely in the protection of railroad equipment and structures. Similarly, rust-inhibitive pigments are being improved and new developments are taking place. We know about some of these and have used them to a measurable degree; others are still in the research laboratories of the developing companies and will not be available to anyone for some time.

*From a paper presented at the annual meeting of the American Society of Mechanical Engineers (Railroad Division).

Metallic Coatings

It is possible to protect steel by applying coatings other than paint, such as non-rusting metals, particularly zinc. Everyone is familiar with ordinary galvanized steel, in which the product is coated and protected by dipping it into a bath of molten zinc. This process can be used only on small-size articles. There is a method, however, by which a zinc or other protecting metallic coating can be applied to large structures, such as steel bridges. By means of a high temperature torch, a wire or zinc fed through the flame is reduced to a molten condition, in which state it is picked up by a blast of compressed air and sprayed on the surface to be protected, just as paint would be sprayed. For several years, I have been following the performance of a large railroad bridge which has been protected by a sprayed zinc coating. The process is expensive at the present time but it is effective. There will be many places where metallic coatings of that sort can be used to extend the life of railroad equipment and structures, with savings in over-all cost.

In some of our water tanks we are experimenting with another type of protection. It has been found that if the steel shell of a water tank can be made the cathode of an electric cell and a continuous electric current passed from the steel shell into the water and thence to a graphite anode suspended in the water, the steel will be rendered non-corrosive. We have three such tanks on our railroad which we have been watching for some years. So far, although there is no paint or other protection on the interior of these tanks, they are absolutely free from corrosion and will probably never fail on that account. For tank work, we can say that this method is successful. We have not worked out means of applying protection of this sort to other structures, but it is not unreasonable to anticipate that cathodic protection may be made available for bridges, rails and other similar applications where corrosion losses are large.

Metallic Coatings and Cathodic Protection Are Two of the Newer Developments in Preventing or Reducing the Corrosion of Steel Water Tanks

In the field of timber construction, we have in the past suffered large losses due to decay and at the present time our uses of timber in structures are almost entirely of creosoted material. One of the disadvantages which we face in using creosoted timber arises from the necessity of air seasoning timber for a year or more after it is cut before it is sufficiently dried to receive the creosote properly. This forces us, in purchasing, to anticipate our requirements of timber about a year and a half to two years. The storage of timber in seasoning yards represents a large monetary outlay, and there is also the expense of handling the material.

A Quick Drying Process

One of the timber treating companies, after experimenting for several years, has just announced a method for drying crossties, which will permit green timber to be taken immediately to the creosoting chamber where it is dried and receives the creosote treatment, all within a space of about 24 hr. Under this new method we can fell a tree today and lay the crossties in track day after tomorrow. The Southern Railway laboratory has done considerable testing of crossties produced by this method, involving full-sized testing to destruction of some 400 ties. Minor improvements still appear to be necessary before this method of quick drying and treating can be considered commercially established but we are so close to a full

acceptance of the method that it seems certain that it will be adopted commercially in the very near future. The economic advantages are obvious.

In the reduction of our losses by decay and corrosion, we are interested in new types of materials which will not be subject to those actions. Asbestos-cement shapes, for instance, have been used to some extent for roofing and siding in buildings and their use will increase. Pre-molded gypsum lumber can also be used in protected locations, such as in sheathing for roofs. The glass industry is producing structural glass which has similar applications. Glass can be made in cellular form so that it will not only serve a structural purpose but will be useful as an insulator.

Chesapeake & Ohio Extends Practices in Treatment of Timber*

By H. M. Church
General Supervisor of Bridges and Buildings
Chesapeake & Ohio, Richmond, Va.

THE diminishing supply of woods of superior quality is forcing the improvement of practices in the preparation and treatment of those species of wood that are next in line of desirability. In treated timber, comparative durability does not result essentially from the structure of the wood, as the usefulness of the grades that have heretofore been considered relatively inferior may be prolonged with intelligent planning in processing and treatment. The possibilities in this direction are being enlarged with the advancement in the art of handling the timber and wider knowledge of the preservatives available for specific uses.

Wood construction has many advantages for varied purposes and, frequently, there is no satisfactory substitute, provided the structure is designed correctly and reasonable protection is provided against certain disadvantages inherent in wood construction, namely, its susceptibility to decay and to attack by insects, marine borers and fire. In some cases, adequate protection may be secured by mechanical means; for example, protection against moisture (to keep wood dry) will prevent decay; a well-designed substructure may prevent termite attack and fire walls and other fire-protective construction will reduce the danger of serious fire loss.

However, it is not always practical or economical to provide such protective measures. In buildings, uninterrupted protection against such factors as condensation, leakage, and minor construction faults cannot always be assured or controlled. In many applications, direct exposure to elements destructive to wood cannot be avoided as, for example, in piers, trestles, bridges and other structures.

The treatment of wood by impregnation with suitable chemicals offers the most satisfactory and economical protection for many of the large variety of structures on a railroad. On the Chesapeake & Ohio, creosote treatment is used as the most suitable protection against decay and insect attack wherever painting, surface cleanliness, odor and fire hazard are not important considerations.

Typical in these applications is the use of small sizes in laminated construction for inter-track platforms, and extending similar sizes to roof sheathing subject to severe exposures to locomotive blasts and gases, to enhance the protection from corrosion and leaching. Heavy-duty crossing slabs are designed to be made of black gum, oak and other hardwood cross and switch-tie stock.

Fire Hazard Important

Where surface cleanliness, odor or painting is an important consideration, salt-treated lumber has been used. In many of these applications, the fire hazard is also important. In some cases, it may be the most important hazard to the structure; in other cases early loss as a result of decay is a greater hazard, and due consideration is being given the relative importance of the two in determining the most suitable treatment to be specified. Ample protection against decay must be also considered, with respect to the type of exposure of the treated timber. For outdoor exposure, decay is usually the greater hazard and durable protecton against decay must be assured.

Wood has long been recognized as good building material when used in the heavy-timber or slow-burning type of construction. By actual test, heavy structural timbers have greater resistance to destruction by fire, and this destruction occurs at a much slower rate, than steel of equal strength originally; thus a wood structure may be saved from collapse because of the greater interval of time which is allowed to bring a fire under control, pressure treatment with fire-retardant chemicals increases this margin of fire-safety.

The Chesapeake and Ohio Has Used Salt-Treated Timber in Many Structures

This factor is now an important consideration in the use of salt-treated lumber and timber, particularly in enginehouses. As wood is not affected by smoke, and when assembled correctly, corrosive action is practically eliminated, this, together with adequate preservative treatment against decay, gives an added quality to wood. For exterior use, lead and oil paints can be applied over fire-resistive treated wood to retard the leaching and weathering of the chemicals.

Lumber and timbers treated for use in buildings or other places where high moisture content or shrinkage after installation will be a disadvantage, should be air-dried or kiln-dried after treatment and before use, to a moisture content suitable for the intended use. To guard against the possible effect of chemicals and excessive heat on the strength of wood, seasoning temperatures in excess of 160 deg., F. should not be employed.

*Presented at the recent meeting of the American Wood-Preservers' Association at Chicago.

Specialties Increase Safety of Motor Car Operation

This article tells how, in the interest of safety and convenience, the Lines of the Missouri Pacific in Texas and Louisiana have added several self-developed, home-made devices to their earlier model section cars, including a combination water keg and tool bracket, an extension handle lifting pipe, level board brackets and automobile-type headlights

Showing the Bracket Which Holds the Water Keg and Provides a Safe Rack for Shovels, etc.

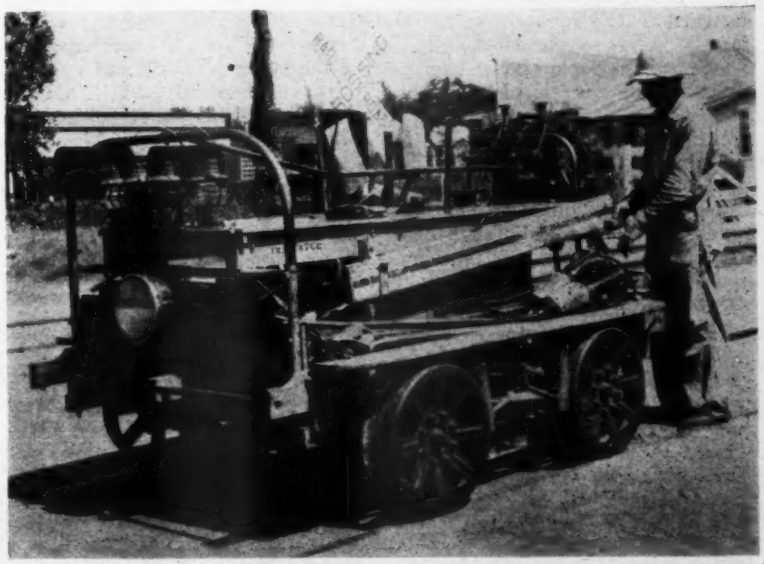
IN the interest of safety, convenience and the orderly loading and operation of section motor cars, the lines of the Missouri Pacific in Texas and Louisiana have equipped all of their Fairmont M-2 wood-frame section motor cars with several home-made devices that are not standard equipment on the cars as purchased, including a combination water keg and tool rack, or bracket; a lifting pipe, to simplify the handling of the cars to and from the track with the aid of a lining bar; level board-carrying brackets; and automobile-type headlights.

The combination keg and tool bracket is little more than a suitably bent piece of 3/16-in. by 1-in. strap steel, with a curved front face to form a support for the upper part of the keg, and with arms which secure it to the side of the car seat frame and provide an enclosing frame for holding a group of shovels, ballast forks and picks in a secure upright position behind the keg. This bracket is applied to the right side of the car, about 18 in. from the rear end, providing a seat for one man behind the water keg, and is fastened to the seat frame by means of two eye-bolts. To hold the keg securely in place against the curved face of the bracket, a length of ⅛-in. steel chain is provided, which is attached permanently to one of the eye-bolts, and which is fitted on the other end with a bridle snap for quick attachment to or release from the other eye-bolt.

To hold the base of the keg securely on the running board of the car, and at the same time prevent its cutting into this board, a ⅛-in. seat of second-hand steel plate is provided, together with two curved wood strips, cut to fit and confine the bottom of the keg. Each of the two confining strips is bolted to the running board by means of two ¼-in. bolts, which also serve to hold the keg seat plate.

The arms of the bracket holding the water keg provide a confining rack, with an opening approximately 10 in. by 15 in., which will hold 10 or more shovels, forks, picks or other short-handle tools readily in a vertical position.

The level board brackets provided on the cars are merely two steel brackets intended to hold the gang's level board conveniently and securely, in a manner that will prevent its falling off or being damaged by contact with other tools. These brackets, which are fixed to the seat sill on the left side of the car, opposite the water



Two Simple Brackets Hold the Level Board Securely and Clear of the Other Tools

The Lifting Pipe Installed Beneath the Cars, in Conjunction With a Standard Lining Bar, Makes an Effective Extension Lifting Handle

keg and tool bracket, are U-shaped, of 3/16-in. by 1-in. bar steel, with a holding hook about four inches deep. They are each fastened to the seat sill by means of two ¼-in. bolts, and are spaced approximately three feet apart.

Extension Lift Pipe

The lifting pipe provided on each of the M-2 section cars, to aid in handling the cars to and from the track in the absence of extension lift handles, consists of a length of two-inch, double-strength black iron pipe fixed longitudinally under the center line of the car frame, into the ends of which a standard lining bar can be placed to form an extension lift handle, long enough to be grasped conveniently by two men. The pipe is the full length of the car frame, is fastened to the forward, center and rear deck sills by means of ⅜-in. by 1-in. steel brackets, and is equipped at each end with a pipe coupling, welded in place, as reinforcing to prevent distortion and splitting.

The headlights provided on all of the M-1 section cars are second-hand automobile headlights, which are fixed rigidly on the front end directly below the seat deck. Power for the operation of these lights is secured from the six-volt battery supplied to each section gang for the operation of the two Barco Unit tie tampers forming a part of its working equipment. Recharging of the battery, which is governed almost entirely by the extent to which it is employed in tamping operations, is done either by rectifier chargers taking current from existing signal system lines, or by means of small portable charging sets. Those section gangs that are without ready access to signal current are equipped with the charging sets as a regular adjunct to their tamper equipment. These charging sets consist of a ⅜-hp. Briggs & Stratton gasoline engine and a six-volt generator, and are given permanent support on a rack attached to the inside of one of the sidewalls of the tool house. Where signal current is readily available, the section gangs are equipped with the rectifier chargers, which are generally located in a signal relay case or other convenient location. The manner in which the section gangs on the Texas and Louisiana lines carry their Barco tampers, upright on the rear of their motor cars, without brackets or fixtures other than a strap or rope, was described in *Railway Engineering and Maintenance* for November, 1943.

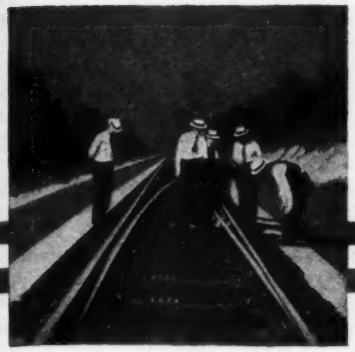
All of the motor car attachments described in this article have been applied to the cars in the field, or at the Palestine (Texas) reclamation shop of the Texas and Louisiana Lines at the time the cars were sent in for general repairs—the work in either case being done under the general supervision of Jack Largent, supervisor roadway equipment. The attachments were developed by J. A. Mann, motor car maintainer.

Products of Manufacturers

Inderon—A New Structural Material

THE Buffelen Lumber & Manufacturing Co., Tacoma, Wash., and the Washington Veneer Company, Olympia, Wash., have developed a new structural product, which is composed of a combination of Douglas fir plywood and a specially-developed plastic which is named Inderon. This material is said to be highly resistant to salt-water and to corrosive and toxic fumes and will withstand high stresses and extreme abrasive action. It's special features are expected to make it adaptable for a wide range of uses and for many special post-war building or construction problems. At present it is available only for Army and Navy uses and is being employed for various purposes by these forces, such as shipping boxes and containers for dropping supplies to troops by parachute. It is also being utilized as a material for table tops in factories and plants where parachutes are folded and packed, where it is said to be particularly useful because of its smooth, splinter-proof surface. Another wartime application of Inderon has been its use for lightweight flooring with a non-slip material laid over the plastic facing.

Inderon is produced by a process of surfacing panels of Douglas fir plywood with plastic laminates under a pressure of 250 to 300 lb. per in. and at temperatures between 300 and 330 deg. F. At present it is being manufactured in only one color, expressly for military use but experimentation and research have shown that it can be made in a wide variety of colors, adapting it to exterior construction, interior wall paneling and all types of built-in construction. The product is said to possess great strength and dimensional stability in addition to being inexpensive and easy to work. The manufacturing process, which utilizes both heat and pressure, produces a material which will not delaminate even under the most extreme exposure.



What's the ANSWER?

More Field Maintenance

In view of the present shortage of labor, should maintenance methods be modified to provide for more extensive repair of work equipment in the field to obtain more hours of service from each machine during the working season? In what ways can this be done?

Must Be in Good Condition

By J. G. Hartley
Assistant Engineer, Pennsylvania, Philadelphia, Pa.

Approximately eight months constitute the working season, and mechanical equipment that is to be used during this period should be in as good condition as possible, to assure that it will be available at all times at full capacity. For this reason, all equipment that is not in use during the inactive season of about four months, should be sent to the shop and placed in condition for the beginning of the next working season. If this is done, only light repairs will be necessary during the working season, which the operator of each unit should be qualified to make.

To insure efficient operation, a work-equipment engineer or maintenance-of-way repairman who is qualified to inspect the equipment and its operation, should be assigned to a specified district, number or type of machines, so that a regular check-up of the mechanical condition and operation of each unit will be made during each specified period. A record of each inspection should be made and forwarded to his superior. Then if an emergency occurs which results in a major breakdown of a unit, the repairman should take the necessary action immediately to have repairs made, and follow the matter through until they are made and the unit is returned to service, keeping his superior officers informed so that they can assist in securing its prompt return to service.

It is also necessary to have a daily report of the operation and condition of each unit, which should be made by the operator and forwarded to his superior officer, so that a running record of the production of each unit can be maintained, by which the condition of the unit can be judged and the future shopping scheduled. The earnest co-operation of the supervisory, inspection and operating forces is required to secure the best return on the investment, which means the greatest production at the lowest cost.

Keep Parts on Hand

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

I have always believed that, where the productive time of a gang depends on the continuous functioning of a power machine or group of machines, it is good practice to keep on hand on the job rather than in some storehouse, those parts that are most likely to break or to wear rapidly. It may be said that this is wasteful material and that at present such action cannot be allowed because critical material is involved. Perhaps, but labor is now more scarce than material, and even an hour's delay because of a machine failure will cost

To Be Answered in September

1. *When preparing track for winter, what special work should be undertaken? When should it be done?*

2. *What special inspection should be made of heating plants before the advent of cold weather? When should this be done? By whom? What items should be given attention?*

3. *In view of present train speeds, when raising track what should be the maximum rate of runoff to allow trains to pass on tangents? On curves? At the end of the day? What considerations determine?*

4. *In view of the present shortage of lumber, to what extent is it permissable to use second-hand timbers for bulkheads at wooden trestles? What precautions should be observed? Why?*

5. *Are rail braces necessary at turnouts? Would shoulders on gage and riser plates give the same results? Why? What are the relative advantages of adjustable and fixed braces?*

6. *What methods can be used to prevent sedimentation from treated water in water lines between pumps and storage tanks? How can such sedimentation be cleaned out most economically?*

7. *Considering the importance of today's traffic and the existing shortage of ties, what minimum stock of ties should be carried on a section during the winter? What other considerations are involved?*

8. *In view of the shortage of lumber, to what extent is it feasible to resaw ties released from bridges for other uses? Other timbers? What uses?*

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

many times the value of the material, measured in either wages or man-hours. Besides, the railways are as much a part of the fighting forces as if they were incorporated in the military organization and delays of this kind may affect the ability of the fighting forces to carry on.

Any large gang that employs several units of work equipment should have a maintainer assigned to it. If this is done, a qualified man is always on hand to watch the operation of the machines, to inspect the equipment currently, to make immediate adjustments when needed and to do other work that will prevent failure of the machines. He will pay for himself many times over in the prevention of delays to the work and of loss of productive time by the gang. Where machines are working alone, reliance must be placed in the traveling maintainer and in the care with which the operator handles his machine and understands it.

This is shown by the fact that one machine will give good service for months, while an identical machine working under the same conditions will require constant attention.

Certain repairs and replacements are required in the field as a result of normal wear and tear that cannot be made readily by the operator. This calls for the services of a skilled mechanic. For this reason it is desirable to employ a traveling repairman where a considerable number of units of work equipment are in service, particularly during the summer months when the equipment is busiest. The most important item of his work will be the instruction of the operator in the correct operation and maintenance of their equipment. This is particularly important now, since experienced operators are not always available and it is sometimes necessary to train "green" men on the job.

This does not mean that he should relieve the operator of any responsibility. If he is called on to make trivial repairs or adjustments that should be made by the operator, his usefulness is greatly impaired. The function of a field maintainer is not to repair machines after they have broken down—but to do his best to prevent the breakdown.

Limitations of Spray Painting

What limitations, if any, are there in spray painting the exteriors of buildings? The interiors? What precautions must be observed?

More Use—More Maintenance

By C. R. Knowles
Superintendent Water Service (Retired)
Illinois Central, Chicago

Work equipment as a whole is receiving the most intensive use in history, and it is obvious that correspondingly more attention must be given to its maintenance if it is to continue to be of maximum service. This means that maintenance must be not only more systematic than formerly, but that it must be more nearly up-to-date in both shop and field. It is understood that every power machine and power tool must go through the shop for general repairs from time to time, generally during the off season when it is not in use. In some cases, it may be desirable to overhaul certain machines in the field, provided no extensive mechanical work is required, but this does not happen often. Field maintenance can be greatly facilitated by providing the maintainer with a light highway truck to carry the tools and repair parts that he needs in order to work in the field.

Assuming that the equipment has been overhauled and placed in good condition, little field maintenance should be needed between scheduled shoppings, other than those ordinary running repairs which are part of good operation. With few exceptions, breakdowns or extensive field repairs are the result of neglect or misuse. The most effective field maintenance is careful operation. The assumption that breakdowns must occur with more or less frequency is erroneous.

Few Limitations

By W. C. Harman
Supervisor of Bridges and Buildings,
Southern Pacific, San Francisco, Cal.

There are few limitations on either interior or exterior spray painting, provided the work is done by skilled craftsmen using modern equipment. Spray painting is rapidly supplanting brush work in many industries. There can be no debate that this method requires more care and skill to insure against damage to other property. We know that automobiles and railway equipment are painted in dust-tight compartments where the work can be carried on without interruption or interference, and under the best possible conditions to obtain the perfect coat. Similar conditions are not possible when painting buildings.

Spray painting, when applied to railway buildings, does have certain limitations. There is an ever-present danger of damage to other property that cannot be covered for protection. Usually automobiles park as close to station and shop buildings as possible. Homes or business buildings frequently adjoin railway property. Sudden changes in the direction or velocity of the wind may carry the finely-divided spray to an automobile or a building, with damage claims as the result. This potentiality has placed a check on spray painting at not a few places where it would have been used otherwise.

Glazed surfaces require knowledge and expert skill. Temperatures must be satisfactory and spray painting cannot be done when strong winds are blowing. Interiors can be painted, however, when the rooms are unoccupied and all furniture and fixtures have been covered to protect them from the atomized globules of paint which float freely in the air. Such paint-laden air is nauseating and unhealthy, unless a mask or respirator is worn. An open flame must not be allowed in or near such a room because of the fire hazard. Trade-union opposition is being raised in some places, but has not gained sufficient momentum as yet to affect spray painting on railway property by railway employees.

The rapidity and success with which spray painting can be done encourages us to keep on trying it and, despite the lack of experienced men, its limitations are being reduced. Suitable protective measures are being developed, appropriate hours for doing the work are being prescribed and the jobs are being surrounded with measures that will enable us to carry on with considerable savings, if not with complete success.

Is More Economical

By W. E. Gardner
Principal Assistant Engineer, Wabash,
St. Louis, Mo.

Correct application of paint with spraying equipment will produce a good finish more economically than brush painting. With the limitations to be mentioned, spray equipment can

be used throughout the year by doing exterior work during the summer and interior painting during the winter.

Small isolated buildings can probably be painted at less cost by brushing than by spraying. The time required to set up the equipment when ready to start the work and to clean it thoroughly upon the completion of the job, may offset any saving in time by using the spray. Painting the interior of small rooms with paint containing a volatile vehicle or thinner should be avoided unless the ventilation is good. Caution should be observed when spraying interior surfaces to avoid the hazard of fire from open flames. Exterior surfaces should not be sprayed during high winds, for sufficient wind to blow paint away from buildings wastes paint and is apt to result in paint settling on other surfaces. A moderate breeze will sometimes carry sufficient paint to spot the finish on an automobile a half block from the job.

Extending Life of Crossings

What precautions during and after installation will contribute to longer life of railway crossings? Of frogs? Why?

Water Worst Enemy

By G. J. Slibeck
Sales Engineer, Pettibone Mulliken Corporation, Chicago

Water is the natural enemy of all outdoor construction and must therefore be given first consideration when installing a railway crossing. We are prone to give line and surface preferred attention, but unless the foundation is stable, neither the line nor the surface can be maintained and the life of the crossing is shortened definitely. Too often oozy mud will be seen pumping up and down in the center of the crossing or at the corners, all because the importance of drainage has been overlooked. Adequate drainage of both the subgrade and the ballast is essential.

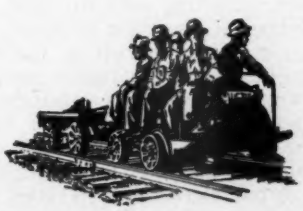
Sufficient ballast is as essential as drainage, but it must also be of satisfactory quality. Either crushed stone or crushed and screened slag is ideal for crossings if of sufficient depth. I have seen everything that could be called ballast used under crossings, ranging from a mere handful of stone to gravel that was so full of sand and clay that the water could not drain out of it.

Of equal importance is the support immediately under the crossing. Nothing excels wood for this purpose, since it must absorb, in part at least, the shock of each pair of passing wheels. If the ballast is not tamped or is wet, this wood becomes the sole support of the crossing and must not only hold it up, but must keep the rolling load from shifting the crossing out of line. This foundation should be so designed that the load is distributed equally over it.

In the days of the bolted crossing, crossties were used generally, being laid diagonally under the crossing. As the wheels passed, each tie took its part of the load and distributed it throughout its length. Incidentally, this disturbed the foundation in the cross line, since the diagonal tie extended out under it. The bolted crossing was articulated throughout its length, by reason of the bolts and short pieces of rail that made up the assembly, and nothing broke except perhaps the fillers, but a lot of wear occurred.

With the advent of the manganese crossing, this type of crossing passed out and longitudinal timbers laid under the rails of the heavy-traffic line came into vogue. It was superior to the crosstie layout but still had one undesirable feature, namely, if both lines carried heavy traffic, the timbers could be used under one line only and the other line was still dependent on crossties.

Recently, some stress-graphs were taken as rolling loads passed over a crossing, which disclosed that the support under the corner was good, but that after a wheel left the corner and just as it got onto the outside arm, a deflection was set up, with the corner acting as a fulcrum. This creates a strong suspicion that it is this action that is responsible for cracked flangeways and broken corners. In other words, these tests indicated that while we have been doing everything that we can to keep the corners of our crossings well supported, we are not doing enough to support the center and arms, to nullify this flexing movement which loosens bolts, cracks flangeways and breaks down corners.



One large railway is now using a framed-timber support under its crossings, which gives support throughout the length of the crossing on both tracks. The timbers are run out under the ends of the crossing arms and under the joints of the connecting rails. I am informed that the results have more than justified the extra cost of this foundation.

Weight of the rail is one feature that has never been given the consideration it deserves. Almost invariably, it has been the practice to make the crossing of the same rail section as that in the adjacent track. This is a mistake, for manganese steel has a far lower resistance to bending movement than open-hearth steel. It is easy to understand, therefore, that when a 100-lb. manganese-steel section is introduced into a track laid with 100-lb. open hearth rail, the crossing will have a greater tendency to bend under the same load than the ordinary rail. Put that crossing on a poorly-drained and not very stable foundation, and the ultimate cost will be far greater than the added cost of a heavier-section crossing and the installation of good drainage.

It is not alone that precautions must be taken when making the installation; vigilance must be exercised during the life of the crossing.

Carry Heavy Traffic

By W. H. Sparks
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Crossings are subjected today not only to more traffic than normal, but to heavier wheel loads and to higher train speeds. This added abuse to which they are being subjected has not changed the requirements for their installation and maintenance; it has merely emphasized the need for care in installation and for better maintenance.

Drainage is of first importance. No crossing should be installed without providing adequate and dependable drainage. Even what seems to be an unreasonable cost will be justified, if one is certain of keeping the ballast and subgrade at the crossing dry. No crossing should be allowed to have its drainage blocked later. Ties must be of the best quality, so placed that

arms and centers receive as good support as the corners. They should be so spaced that there will be no interference with tamping. When the crossing is installed, the old ballast should be dug out and replaced with clean hard crushed stone, which should be kept clean during the full service life of the crossing.

Too much cannot be said about the importance of inspection and prompt maintenance. Both surface and line should be maintained to high standards. Bolts should be kept tight, and an adequate number of anti-creepers should be installed in all directions from the crossing to insure that creeping rail will not affect the line.

Using Released Bridge Ties

In what way can bridge ties recovered during the replacement of trestles or the renewal of decks on steel spans, be used? What considerations govern?

Finds Them Useful

By General Inspector of Bridges

Since we do not use untreated material for bridge ties, we get relatively few second-hand ties that have failed from decay, and these are usually ties that were installed before we began to prebore holes for the spikes. Most of those we now recover when making renewals have failed by reason of rail or plate cutting or from crushing. We have a considerable number of bridges with wide stringer spacing, which require deep ties, and at one time we had a large number fail from horizontal shear, but through better control of the treating process we now have few failures of this type.

Ties that are sound and only slightly plate cut, can be used to replace failed ties in other structures. In general, they should not be used singly, unless the amount of cutting corresponds with that of the ties adjacent to the one that is being replaced. In some cases, on trestles where the wooden stringers give the tie a wide bearing, and where the adjacent ties are not plate cut, it may be possible to turn the replacement tie over and use it alone. If a considerable number of ties in a structure require replacement, it is a simple matter to use the second-hand ties in groups.

If the ties are decayed around the spike holes or under the rail, they can be used for cribbing, as fence posts or for similar purposes where strength is not an essential requirement, giving consideration, however, to their probable life in the service to which they are transferred, depending on the extent of the decay. Such ties should not be used in any construction that will normally outlast their probable remaining life. In other cases, the damaged sections can be cut out and the sound wood remaining can be used for blocking, for which there is always a strong demand. Sections suitable for blocking can sometimes be obtained from crushed ties, but in the main they have little value except for temporary low crib walls.

Hold onto Treated Timber

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

We have not used untreated ties on either trestles or steel spans for many years, for which reason about 98 per cent of our tie failures are caused by wear directly under the tie plates. In general, the remainder were decayed at the time of treatment. When we find it necessary to renew a trestle, ties that are fit for further use with other material from the structure, are set aside for re-use on other trestles or spans, in either out of face or spot replacements. In many cases ties that are worn in this manner can be used by turning them upside down.

Where this wear has damaged the tie to an extent that it is not suitable for re-use, the damaged or decayed part under the rail can be cut out and the centers and ends can be used as footing blocks under foundation posts of platforms and small buildings. In many cases, we have used the center section of such ties in the construction of small box culverts on light-traffic lines, some of which have been in service as long as 15 years and still remain in good condition. Even though they have been in service only four or five years, second-hand ties should never be mixed with new ties, unless they are turned with the tops down to afford an equal support for the rail.

Treated material of any size should not be burned or destroyed in other ways, since there are so many applications in which it can be used. For many years we have been using ties that were removed from trestles, which we did not consider suitable for re-use in bridges, for end walls. Some, in service as long as 12 years, are still in good condition.

Maintaining Curve Elevation

What measures should be employed to insure the maintenance of correct elevation on curves? Does the character or density of traffic make any difference? The speed of trains? If so, what?

Frequent Check Needed

By H. F. Fifield
Engineer Maintenance of Way, Boston & Maine, Boston, Mass.

Elevation tables have been worked out, based on the degree of curve and the maximum speed permitted, showing the elevation to be used for each rate of curvature. These tables are furnished to division engineers and others, including foremen, with instructions to use them as issued unless circumstances require variation from them, which variation must be approved by the engineer maintenance of way. Foremen and others interested are instructed carefully concerning the necessity for maintaining the correct elevation at all times, this being especially true for high-speed lines. A frequent check should be made by the supervisor to see that these instructions are being followed.

The character of the traffic and its density are studied carefully for each line, and these data are considered by both the operating and engineering departments. The maximum speed is then set up for each line, based on curvature, whether the line is single or double track and whether freight or passenger traffic predominates. It is also decided at this time whether speed or tonnage shall be sacrificed where this alternative is necessary. Lines with both high-speed and heavy-freight traffic require frequent and careful inspection by every officer interested, since the correct elevation must be maintained as a matter

of safety as well as to maintain the tonnage rating.

As train speeds increase, the necessity for the maintenance of correct elevation also increases, to assure safe and comfortable-riding track. This is impressed on all of those who have any responsibility for maintaining the correct elevation.

Must Compromise

By C. W. Breed
Engineer of Standards, Chicago, Burlington & Quincy, Chicago

An essential to the maintenance of correct elevation on curves is the selection of the elevation for each curve that is best adapted to the particular kind of traffic that moves over it. This information must be placed in the hands of the roadmaster and the foreman, for too much elevation or too little will add to the difficulty of maintaining elevation.

Generally, main tracks carry mixed traffic, which may vary from high-speed streamlined passenger trains to the heavy-tonnage "drag" type of freight trains. For this reason, the engineer must take into account safety and comfort for passengers, in the first instance, with increased curve resistance for the slower freight trains. As a practical matter, the selection of the amount of elevation for curves over which both passenger and freight trains are operated should be a compromise, with the safety and comfort of passengers the first consideration. Obviously, the maintenance of correct elevation will be affected by this selection.

After the elevation has been established, the next important step is to keep the joints in surface, for the outstanding factor in causing discomfort to passengers in high-speed trains is low joints, particularly in the high rail. Low joints in both rails increase nosing, the discomfort from which is greater as the train approaches equilibrium speed.

Elevation is measured from the low rail, so that one of the major problems connected with the maintenance of curve elevation is that of maintaining the low rail to correct grade and surface. Unfortunately, permanent grade stakes are not practical, for if placed between tracks they become a menace to trainmen, and if placed on the outside they interfere with spreaders, mowers and other power machines.

Again, the level of the track changes as the ballast is pounded down and compacted, particularly on heavy-traffic lines, so that stakes set for a ballast lift soon become too high to be useful. Bringing the track to the stakes set at the time of ballasting, with frequent checks thereafter with the level board, are the best means of maintaining correct elevation.

Keep a Record

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

One of the best ways to insure the maintenance of correct elevation on curves is to have the section foreman measure the elevation at frequent intervals, recording each measurement for each curve. He should send one copy of this record to his supervisor or roadmaster and another to his division engineer, keeping one for himself.

In this manner the foreman keeps himself informed currently as to the condition of his curves and his superior officers also have this information recorded currently. These officers should keep these reports on file and study them. When it is found that the elevation of any curve is increasing, a study should be made to determine the reason, which will probably develop that the curve had been given too much elevation in the first place. Conversely, if the curve is losing elevation, analysis may develop that the curve was elevated too little originally.

Probably, this is not a very scientific way to study elevations, but it does get results. By this method, neither the character nor the density of traffic makes much difference, unless either or both change radically, provided the established elevations are altered to meet these changes. Neither does the speed of trains make much difference, unless there is considerable change in allowable speeds, in which event the established elevations must be changed.

Conserving Pipe Fittings

In view of the restrictions on pipe fittings, in what ways can they be conserved? Replaced? To what extent can screwed and flanged fittings be salvaged and re-used?

Three Types

By J. P. Hanley
Water Service Supervisor, Illinois Central, Chicago

Bell and spigot fittings can be salvaged easily, since the lead jointing material is easily melted and the fittings themselves are so heavy and relatively strong that they withstand rough handling without breakage. Being made of cast iron, they deteriorate slowly and can be salvaged and re-used an indefinite number of times. Under existing conditions, all cast-iron pipe lines not in use should be marked for salvage and the fittings included as a part of the project.

Flanged fittings are also easy to salvage, since they can be unbolted with simple tools and a high percentage will be in condition for re-use, because deterioration is slow by reason of their relatively heavy section. When salvaging flanged fittings for the medium and larger sizes of pipe, the pipe is usually burned off with a torch to give sufficient clearance to free the fitting. The short ring of pipe left in the flange is then removed with a hammer and chisel, without injuring the threads of the flange. Bolts and nuts should also be salvaged, unless they are too badly rusted to be fit for further use. If the flanges are to be re-used by welding, the short pipe ring need not be removed, provided it is sound, but it can be welded to the new pipe.

Screwed fittings are least adapted for salvage, unless a welder's torch is available for cutting them out of the pipe. Formerly, they were broken with a sledge hammer instead of being unscrewed and saved. Standard fittings are of relatively light weight and deteriorate somewhat rapidly, both inside and outside, so that only a small percentage can be recovered from an old pipe line. Extra-heavy fittings, however, are worth saving for re-use, especially when they can be cut out of the line.

Welding Saves Many

By Chief Engineer

Since all modern pipe installations, other than cast iron, are welded, the minimum of line fittings is required, so that, altogether, there is an enormous saving in couplings, as well as in dies for cutting threads. Furthermore, because of the better joint, a lighter pipe can be used than with screwed fittings, thus saving in pipe material. Also, by utilizing wrinkle

bending, many special elbow fittings can be eliminated.

When replacements of screwed fittings are needed, the pipe can be welded, instead of replacing the fittings. Again, if screwed fittings have become corroded or the thread end is worn, they can be reinforced by welding, and the threaded ends can be welded to the pipe, thus making it possible to re-use the fittings. In the overall picture, the welding of pipe saves a lot of material and of labor for repairs, while it eliminates water, steam and air losses, because the welded connections give a continuous pipe and do away with line leakage, which is likely to develop in any pipe line having screwed joints.

Too Rarely Done

By Inspector of Water Service

The conservation and salvage of pipe fittings are all too often neglected under normal conditions when they can be obtained readily. Although the present restrictions on their use do impose hardships on the pipe fitter, they have at least emphasized the importance of the more careful use of pipe fittings, and will doubtless result in more attention being given to the salvage and re-use of this type of material.

It is possible to reduce the use of both screwed and flanged fittings by planning pipe layouts more carefully with a view to minimizing the number of fittings. In addition, careful planning almost invariably results in a better-looking job. For example, where a valve must be located near a bend, an angle valve will eliminate both the elbow and the globe valve, as well as two joints. Again, a street elbow or a union fitting can sometimes be used instead of a standard elbow to reduce the number of fittings required. Still again, a 150-lb. cast-iron fitting will give the same service on a low pressure line as one designed for 300 lb. or 600 lb.; it will weigh less and cost less than the cast steel or forged steel fitting made for the higher pressures.

Fittings should be classified as to size and kind when they are stored, so that they can be found readily when needed. They should be stored in a dry place to prevent rusting. Care should be exercised when applying them, using the right size and kind of wrench. A pipe wrench will squeeze and may easily damage them. A monkey wrench should be used for fittings with parallel sides, or with square or hexagonal ends. Open-end wrenches of the correct size should be used on the bolts and nuts of flange fittings. A wrench that is too large should be avoided since it will have more leverage than is necessary and may crack the fitting or twist it out of shape.

In the past, the salvage of pipe fittings has been largely a matter of economy and expediency. In many cases, the cost of salvaging the fittings was equal to or greater than their monetary value. For this reason, the hammer and cutting torch were used instead of wrenches when dismantling pipe lines. Conditions have changed, however, and while economy should not be overlooked, the present need for the material overshadows all other considerations. Fittings can be obtained only with difficulty and when obtainable, deliveries are uncertain; also the cost of the material has increased; all of which, are added reasons for salvaging any fitting that can be re-used. They deteriorate but little in use and if usable, require no reconditioning.

Assigning a Trainmaster

In view of the present density of traffic, is there any advantage in assinging a trainmaster to ballasting operations? If so, what? If not, why? To whom should he report?

There Is an Advantage

By G. S. Crites
Division engineer, Baltimore & Ohio, Baltimore, Md.

There is an advantage in assigning a broad-minded transportation officer to a large ballasting operation for the purpose of handling maintenance of way work trains, or on any other work of magnitude. The character of the transportation difficulties in connection with ballasting operations should be taken into consideration when assigning a transportation officer to assist in train operations. I once tied up a tea extra, a silk train, a mail train and four "OD" fruit trains with a ballast train because we were given inadequate motive power to unload ballast. An engineman who relieved me on this particular assignment, was afterward made superintendent of an important division while I was still in college.

It should not be overlooked that conducting transportation now involves moving troops, military supplies and equipment, oil, raw materials and semi-finished materials for war industries, besides regular civilian goods and materials and the largest passenger traffic in history. Obviously, under such conditions, a ballast train is both a necessary evil and a luxury—and an expensive one—involving several special problems. If the ballasting is being done in a terminal, a terminal officer should be assigned to supervise the work trains to insure that those of the right consist will arrive at the right time.

The problem may involve assembling ballast from pits or quarries far removed from the ballasting job. In such a case, it will be an advantage if the transportation officer has had dispatching experience. The president of two large and important roads got their first transportation experience while handling ballasting work trains. Where ballasting involves work-train movements similar to those made by local freight or "way" trains, the supervising officer should have had local freight experience.

If the securing of power and seeing that it is always ready when needed is the problem, it may be that a traveling engineer or road foreman of engines is the most suitable one to direct work-train operations. It makes little difference to whom the transportation officer reports, provided he is the right man for the job. Obviously, however, the roadway officer in charge must keep him informed as to what is needed.

Pays Large Profits

By District Engineer

Even under normal conditions, the assignment of a trainmaster or an assistant superintendent to a large maintenance operation will pay a surprising profit, especially if one or more work trains are required for the work. I have even seen cases where the assignment of two trainmasters was profitable to both the roadway operation and the transportation department. The advantages of having a transportation officer on the job, with authority to direct train movements, is not confined to ballasting, however, for there may be an equal advantage in having such an officer with a rail gang, with a ballast-cleaning operation, on track elevation or other construction work that may interfere with scheduled trains, or

sometimes when renewing a bridge. In fact, he may save enough time for a work train to more than pay his own wages and for a large gang to multiply this amount many times.

Where work of this character must be done at this time, when the density of traffic is so much greater than normal and the need of keeping it moving without delay is so urgent, the advantages of having a responsible transportation officer on the ground are increased correspondingly. The maintenance officer in charge of the work will, in large measure, be relieved of the burden of looking out for trains and can, therefore, give more of his attention to the work in his charge. He should keep the trainmaster informed of his requirements far enough in advance to enable that officer to make his own arrangements intelligently and sufficiently in advance to minimize delays to all trains.

Mention was made of two trainmasters on one project. In this case, a gravel pit with a washing plant, located about 50 to 60 miles from the ballasting operation, provided the ballast. A certain amount of switching was necessary to facilitate the loading of the cars and to assemble outbound trains, and we found it best to station a trainmaster at the pit as well as with the ballast gang.

The officer to whom the trainmaster should report depends on the character of the work and the conditions surrounding it. On ballasting, laying rail, renewing a bridge and other work of this character, that is of sufficent magnitude to warrant the assignment of a transportation officer, it will be better for him to report to the superintendent. On some classes of construction, however, particularly where there is constant shifting of the routing of trains over the work, both the movement of trains and the progress of the work will be facilitated if he reports to the engineer in charge. There may be some opposition to such an arrangement, from transportation officers, but experience shows that it has worthwhile advantages.

Contracting Building Repairs

If sufficient labor cannot be secured to complete building maintenance programs, should small building repairs be contracted locally? To what extent and for what work?

May Be Imperative

By A. T. Hawk
Engineer Architect, Chicago, Rock Island & Pacific, Chicago

It is often quite desirable and sometimes imperative that we do certain emergency repairs and even minor repairs by contract, especially where the total cost of the work is not too great. Many roads, especially western lines, have a considerable number of branch lines, some of very little importance where train service is limited, sometimes to one mixed train each way per day. Even on important main lines, served by streamlined and other through trains, it is often equally difficult to get to many stations. The result is that, frequently repairs that should be made are neglected, particularly at this time when men are so scarce. By contracting these small jobs locally, the emergency items can be cleaned up quickly and economically, and this practice tends to create a friendly feeling in the community.

Before contracting more important work, it is necessary to ascertain whether the regular maintenance of way forces are fully employed, and that it has been impossible to obtain the additional men required to do the work. This applies to any project of considerable importance and cost, and where the regular forces are not sufficient to keep up with the present desire to wipe out the deferred maintenance that still persists from the depression period. If this work can be done by contract, it can usually be expedited. Generally the labor and materials can be obtained locally. In this way, also the movement of camp cars is eliminated, relieving to this extent the present overworked railway transportation machine and thus aiding in the war effort.

Unions Object

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

At present, and for some months, on some lines or parts of lines, it is and has been practically impossible to carry out our needed building maintenance program, because of the acute shortage of carpenters and helpers, and even of labor. This situation is more acute on some divisions than on others. In some cases, a considerable number of skilled and semi-skilled men could be obtained if they were willing to work away from home and live in camp cars or boarding houses, but those who are seeking employment or are willing to work away from home have obtained employment in war plants where wages are higher.

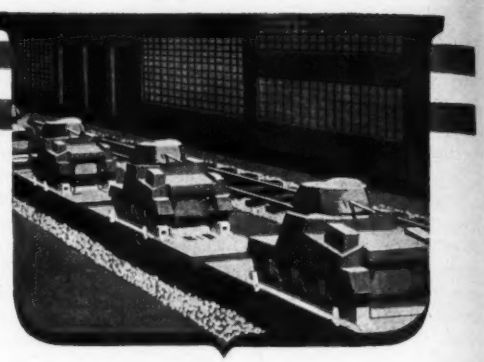
Almost all roads are confronted with a serious shortage of labor in the bridge and building department. A few men have remained in the gangs, mainly those who have acquired seniority through long years of service and have earned a prescriptive right in the pension system as it applies to railway employees. In large part, these men have reached the age where they are not now able to do the hard work they performed when they were younger. But younger men are not available for they are either in military service or war work. About all that is left for us to draw on is a few discharged soldiers who are not fit for the army, most of whom have no bridge and building experience or mechanical ability.

During the depression, when earnings fell to so low a point that we were compelled to curtail our work and to defer a large amount of needed work, we fell badly behind and have not yet caught up on our building maintenance. The enormous increase in traffic has caused much of this deferred maintenance to become important. It is, therefore, the desire of every railway officer to correct these conditions to meet the requirements of the great volume of business that is being handled.

Obviously, we prefer to carry out our maintenance work with the regular forces in our own organization. The time has come, however, when this cannot be done, and the best solution of this problem will be to have local contractors do the work. In both the larger cities and the villages along our line, it is possible to find men who do small contract jobs. These men are acquainted and are able to obtain enough carpenters, mechanics and helpers for any job that does not take them away from home.

Probably the greatest drawback to doing this is the necessity for getting permission from the union. If this permission can be obtained, much of our deferred maintenance can be wiped out. Where contract work is contemplated, the company should provide the material and contract for the labor only. This is the only way that any standards for material can be kept under control. The contractor may be honest and anxious to do satisfactory work, but contractors differ widely as to what material is the best for a given purpose.

NEWS of the Month



Organize Institute for Plywood Experimental Work

Plywood Research Foundation has been organized by the plywood industry to promote greater utilization of Northwest timber through the development of additional products. An initial fund of $100,000 has been established, and a laboratory will be located at Tacoma. The new foundation is a long-term undertaking, and for its operation a separate corporation has been formed.

Burlington Foreman Given Bravery Medal

Arthur F. Woodrick, a track foreman on the Chicago, Burlington & Quincy, has been awarded a bronze medal of honor by President Roosevelt under the 1905 law which provides for such medals for outstanding feats of bravery connected with saving lives upon railroads.

The act which led to this award occurred when a rail motor car overturned and caught fire near Batavia, Ill., pinning Walter E. Rundle, a track laborer who was riding the motor, to the ground. Foreman Woodrick extricated the man from beneath the burning motor, receiving severe burns while doing so. Both men required lengthy hospital treatment for their burns.

1943 Crossing Accidents

Rail-highway grade crossing accidents in 1943 resulted in the deaths of 1,732 persons and injuries to 4,217, as compared with 1,970 deaths and 4,616 injuries in the previous year, according to a report released last month by the Interstate Commerce Commission.

Compared with the pre-war year of 1940, the Bureau points out, the 1943 totals were lower by 7.87 per cent for the number of accidents, 4.2 per cent for fatal injuries, and 8.96 per cent for non-fatal injuries. "The effect of wartime driving restrictions," it adds, "is reflected in these reductions since rail traffic in 1943, measured by train-miles in transportation service, exceeded that of 1940 and 1942 by 33.45 and 6.39 per cent, respectively."

Notwithstanding the decline, however, grade-crossing accidents "still comprise an important segment of the total number of casualties arising from railway accidents of all kinds." The 1943 deaths from crossing accidents constituted 36.99 per cent of the fatalities in all accidents resulting from train operation. The comparable 1942 figure was 39.38 per cent.

General Clark Honors Military Railway Service

Given for "excellence in discipline, performance and merit," the Fifth Army plaque and clasp has been awarded by Lt.-Gen. Mark W. Clark to the entire Military Railway Service under the command of Brig.-Gen. Carl R. Gray, Jr. The award is the highest yet to be given to the military railroaders and was presented to Gen. Gray by Gen. Clark's deputy chief of staff at a ceremony attended by the former's railroad staff and officers of his operating and shop units. In a letter which accompanied the award Gen. Clark said in part:

"I have regarded with mounting admiration the operations of the Military Railway Service in its support of the Fifth Army. From the early days at Paestum, the effectiveness of those operations has been inextricably linked with the success of the Italian campaign.

Railroads Tell of Engineering Research

As an answer of the American railroads to government charges that the railways have embraced policies and practices which tend to place restrictions upon the adoption and use of new technological developments, the Association of American Railroads recently submitted a lengthy report to the Senate committee on military affairs' subcommittee on war mobilization, 15 pages of which dealt with a review of roadway or engineering research activities in connection with way and structure maintenance.

Under a general heading of The Influence of Engineering in the Development of the Present Railway Efficiency, the 15-page section of the report dealt exclusively with the influence of engineering investigation on the development of way and structures during the growth of railroad mileage from 1830 to 1940. The paper went into comprehensive detail of this phase and among the important factors dealt with, under individual subheads, were rail, ties, rail fastenings, spikes, rail anchors, frogs and switches, roadway and ballast, line changes and grade revisions, bridges, stresses in track, relation of track and rolling stock, maintenance of way equipment, and wartime emergency measures.

Rules Set for Rehiring Returning War Veterans

Outlining the principles to be followed in the administration of the provisions of the Selective Service Act dealing with the re-employment of war veterans, a memorandum has been made public by the national Selective Service headquarters which contains the following requirements:

Seniority rights accumulate during the veteran's period of active service in the armed forces in the same manner as they would have accumulated if he had remained continuously at work in his civilian occupation.

A veteran, in order to claim reinstatement in a position, must be qualified to perform the duties of that position. If unable to qualify for an upgraded job, he still is entitled to a position equal in pay, seniority and status to the one he left.

A veteran is entitled to reinstatement in his former position or one of like seniority, status and pay, even though such reinstatement necessitates the discharge of a non-veteran with greater seniority.

A veteran is entitled to his former position or one of like seniority, status and pay, and may refuse another, even though the pay is greater and it offers other advantages.

Conscientious objectors have no re-employment rights under the Selective Service laws.

Those eligible for veterans' preference are "persons who entered the Army, Navy, Marine Corps or Coast Guard (male or female) subsequent to May 1, 1940, but the veterans seeking benefits must have a 'certificate' indicating satisfactory completion of service in the armed forces."

The veteran is required to make application for re-employment within 40 days after he is relieved from training and service. "This is mandatory and compliance is essential if the veteran is to enforce his re-employment rights over the objection of the employer."

A veteran entitled to re-employment rights has recourse to the courts to recover back pay after reinstatement if it was improperly delayed or postponed by the employer.

A veteran entitled to re-employment may not be discharged from his restored position without cause within one year thereafter. The question of "cause" is to be determined by "standards of common sense" in accord with the practices and customs of the industry and locality. The same one-year limit affects displacement of the veteran by another with greater seniority rights.

A soldier who is placed in an inactive status and transferred to the Enlisted Reserve Corps at his own request, on condition that he will engage in essential industry, is required to apply to his former employer for re-employment within 40 days thereafter in order to maintain his re-employment rights.

The responsibility of Selective Service in connection with the reinstatement of veterans in their old jobs is discharged through a Veterans Personnel Division at national headquarters, with decentralized responsibility to state directors, with authority to set up local machinery to carry out such responsibilities.

A private employer is not required to reinstate a veteran if his circumstances have so changed as to make is unreasonable or impossible to do so. What changes in circumstances will so result must be determined by the facts in each case, and the employer's convenience is not to be considered.

Personal Mention

General

G. J. Willingham, superintendent of the Illinois division of the Illinois Central, with headquarters at Champaign, Ill., and an engineer by training and experience, has been advanced to assistant to the vice-president and general manager, with headquarters at Chicago.

L. G. Walter, Jr., division engineer on the Columbus division of the Pennsylvania, with headquarters at Columbus, Ohio, has been promoted to superintendent of the Delmarva division, with headquarters at Cape Charles, Va.

S. R. Young, chief engineer of the Atlanta & West Point and the Georgia, has been appointed assistant general manager of the two roads and of the Western of Alabama, with headquarters at Atlanta, Ga. Mr. Young's former position has been discontinued.

W. D. Faucette, chief engineer of the Seaboard Air Line, has been promoted to the position of executive representative, reporting to the receivers. Mr. Faucette's duties will include the handling of matters with the federal authorities, and with various authorities in the states through which the Seaboard operates, in addition to any other matters that may be referred to him by the receivers.

John A. Rogers, whose promotion to general superintendent of transportation on the Central region of the Canadian

John A. Rogers

National was reported in the May issue, was born at Cayuga, Ont., on July 19, 1883. He attended Royal Military College at Kingston, Ont., and entered railway service in 1904 as a draftsman of the Illinois Central at Chicago. The following year Mr. Rogers became a topographer of the National Transcontinental Railways (part of the Canadian National), and in 1911 he was appointed resident engineer for the Mackenzie and Mann Construction Company at Edmonton, Alta. He was promoted to division engineer of the Canadian Northern and the Canadian National with headquarters at Saskatoon, Sask., in 1916, becoming assistant superintendent of the Canadian National at that point in 1927. In 1930 Mr. Rogers was promoted to superintendent at Prince Albert, Sask., and he was transferred to Hornepayne, Ont., later in the same year. After serving also as superintendent at Allandale, Ont., and Ottawa, he was appointed general superintendent at the Alberta district, with headquarters at Edmonton, in 1942.

Arthur Anderson, whose appointment as assistant to vice-president, improvements and development, of the New York Central at Washington, D.C., was announced in the April issue, was born on October 17, 1895, at Medicine Hat, Alta. In 1915 he received a B.S. in C. E. degree from Tri-State Engineering School at Angola, Ind., and entered railroad service in January of the following year as a levelman of the New York Central. After working also as instrumentman and draftsman in the office

Arthur Anderson

of the division engineer at Chicago, he became, in March, 1925, instrumentman on preliminary surveys for track elevation at South Bend., Ind. From July, 1926, until April, 1942, Mr. Anderson held the positions of engineer draftsman and assistant engineer in the office of engineer of grade crossings, on preliminary plans and estimates for grade crossing elimination projects, at Cleveland, Ohio, and Chicago. For the past two years he has served as assistant to the late John G. Brennan, assistant to the vice-president, at Washington, D. C., a position which he held until his recent appointment as assistant to vice-president and secretary of the Committee on Grade Crossing Elimination, A.A.R.

Horace C. Grout, general manager of the Western lines of the Canadian Pacific, with headquarters at Winnipeg, Man., and an engineer by training and experience, has been promoted to chief executive officer of the Minneapolis, St. Paul & Sault Ste. Marie (part of the Canadian Pacific), with headquarters at Minneapolis, Minn.

John H. Cooper, superintendent of the Ft. Wayne division of the Pennsylvania, and an engineer by training and experience, has been promoted to general superintendent of the Northwestern division, with headquarters at Chicago.
was born at Easton, Pa., on July 5, 1883, and graduated from Lafayette College in 1905. He entered the service of the Pennsylvania on October 13, 1905, as a rodman on the Sunbury division and was transferred to the Williamsport division on March 9, 1910. On August 11 of that year he was advanced to transitman in the general office at Philadelphia and on January 1, 1911, became assistant track supervisor on the Tyrone division, being transferred successively to the Conemaugh, the Philadelphia and the Philadelphia Terminal divisions. He was advanced to track supervisor on the Trenton division on October 25, 1917, and was transferred to the New York division on March 1, 1920. Mr. Cooper was appointed division engineer of the Philadelphia division on November 1, 1923, and on January 1, 1926, he was transferred to the Monongahela division. On April 1 of the same year he was transferred to the Philadelphia Terminal division with headquarters at West Philadelphia, Pa. In July, 1927, Mr. Cooper was appointed engineer maintenance of way of the Southern division, and in December, 1927, he was advanced to superintendent of the Schuylkill division, with headquarters at Reading, Pa. On February 15, 1931, he was transferred to the Ft. Wayne division, remaining in that location until his new appointment.

Engineering

Dudley T. Parrish has been appointed assistant to the chief engineer of the Clinchfield, with headquarters at Erwin, Tenn.

W. R. Peck has been appointed engineer maintenance of way of the Atlanta & West Point, the Western of Alabama, and the Georgia. The position of chief engineer has been abolished.

A. T. Powell, engineer accountant of the Grank Trunk Western, with headquarters at Detroit, Mich., has been appointed office engineer, with the same headquarters, a change of title. The position of engineer accountant has been abolished.

A. M. Harris, division engineer on the Renova division of the Pennsylvania, with headquarters at Erie, Pa., has been transferred to the Columbus division, with headquarters at Columbus, Ohio, succeeding **L. G. Walker, Jr.,** whose promotion to superintendent of the Delmarva division, with headquarters at Cape Charles, Va., is reported elsewhere in these columns.

J. W. Smith, superintendent of the Georgia division of the Seaboard Air Line, with headquarters at Atlanta, Ga., has been promoted to assistant chief engineer at Norfolk, Va. **J. R. Traphoner** has been named assistant to chief engineer

with his headquarters also at Atlanta.

R. A. Bristow, instrumentman on the Des Moines division of the Chicago, Rock Island & Pacific, with headquarters at Des Moines, Iowa, has been promoted to acting division engineer of that division, with the same headquarters, succeeding **John B. Whiting,** who has been granted a leave of absence.

With the retirement of **J. L. Kirby,** chief engineer, maintenance of way, of the Seaboard Air Line, the engineering and maintenance of way departments of that road have been consolidated, and will be under the jurisdiction of the newly appointed chief engineer, **W. D. Simpson.** Mr. Simpson succeeds **W. D. Faucette,** whose promotion to executive representative is reported elsewhere in these columns.

Crosby Miller, whose promotion to chief engineer of the Chesapeake & Ohio with headquarters at Richmond, Va., was announced in the June issue, was born at San Francisco, Calif., on September 1, 1881. He attended the University of California, graduating in 1904, and then was employed successively by the Phoenix Bridge Company; the New York Central, at New York; C. W. Hudson, consulting engineer, also of New York; and the Pennsylvania Steel Company. On June 8, 1914, Mr. Miller became bridge engineer of the Chesapeake & Ohio, being promoted to assistant chief engineer on March 15, 1943.

A. C. E. Mullen, district engineer of the New York, New Haven & Hartford, with headquarters at New York, has retired at his own request because of ill health, after nearly 39 years service. **M. J. McGovern** has been appointed acting district engineer.

Mr. Mullen was born at New York on October 8, 1882. He attended business college, studied at the City College of New York for two years, and at Columbia University for three years. On June 26, 1905, he entered railway service as a rodman for the New York, New Haven & Hartford, becoming an inspector the following year and a junior assistant engineer in June, 1907. After serving as assistant engineer and assistant location engineer, Mr. Mullen was named general foreman on March 13, 1913. In April, 1914, he was again appointed assistant engineer, becoming pilot in July, 1915. During World War I he was a first lieutenant, Corps Engineers, United States Army, returning to the New Haven as an assistant engineer on April 2, 1920. He was named construction engineer on June 16, 1926. On March 1, 1933, Mr. Mullen was appointed district engineer.

A. M. Schachtner, chief fire inspector of the Chicago & North Western, with headquarters at Chicago, has been promoted to insurance supervisor, with the same headquarters, succeeding **W. A. Goss,** who has resigned. **B. M. Whitehouse,** general bridge inspector at Chicago, has been advanced to chief fire inspector, relieving Mr. Schachtner, and **L. D. Garis,** assistant general bridge inspector, has been promoted to general bridge inspector, with headquarters as before at Chicago, replacing Mr. Whitehouse. **J. B. Loedski,** assistant general bridge inspector, with headquarters at Chicago, has been appointed office engineer of the bridge department, with the same headquarters, succeeding **Walter L. Anderson,** who has been promoted to assistant general bridge inspector, relieving Mr. Garis. **H. H. Hall,** an instrumentman on the Iowa division, has been advanced to assistant general bridge inspector at Chicago, replacing Mr. Loedski.

Albert M. Zabriskie, whose promotion to chief engineer of the Central of New Jersey was reported in the May issue, was born at Nelson, N.H., on June 3, 1882, and

Albert M. Zabriskie

entered railway service in January, 1902, in the engineering department of the Lehigh Valley. In June, 1904, he jointed the Central of New Jersey as a transitman, becoming an assistant engineer in November, 1906. This position he held until January, 1917, when he was appointed engineer of design. In October of that year Mr. Zabriskie was named principal assistant engineer, and in July, 1938, he was promoted to assistant chief engineer, serving in the latter capacity until his recent appointment.

G. T. Tate, whose retirement because of ill health as principal assistant engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., was reported in the June issue, was born at Columbus, Ga., and graduated in civil engineering from the Alabama Polytechnic Institute in 1910. He entered L. & N. service on September 9, 1910, as a rodman on construction and was later promoted to locating engineer and assistant resident engineer. During the first World War he served overseas with the 22nd Engineers of the U. S. Army, afterwards returning to the L. & N. On March 1, 1923, Mr. Tate was appointed office engineer for the chief engineer of construction, and on January 1, 1932, he was promoted to assistant engineer in the chief engineer's office. On March 1, 1941, he was advanced to the position he held at the time of his retirement.

G. H. Beasley, whose promotion to principal assistant engineer of the Louisville & Nashville, with headquarters at Louisville, Ky., was reported in the June issue of *Railway Engineering and Maintenance,* was born at Williamstown, Ky., on September 29, 1894, was graduated from the University of Kentucky in January, 1919. He entered railway service in the same year as an instrumentman on the L. & N. at Ravenna, Ky., and in 1923 he was promoted to draftsman in the office of the chief engineer at Louisville. Two years later he was advanced to assistant engineer on the Eastern Kentucky division, with headquarters at Ravenna, and in 1937 he was promoted to division engineer of that division, with the same headquarters. On October 1, 1943, Mr. Beasley was appointed assistant engineer in the chief engineer's office, the position he held at the time of his new promotion.

L. E. Gingerich, superintendent of the Delmarva division of the Pennsylvania, with headquarters at Cape Charles, Va., has been appointed chief engineer maintenance of way of the Central region. Mr. Gingerich was born on December 7, 1899, at York, Pa. After serving in the United States Army during 1918, he entered Gettysburg College, and was graduated in 1922. He was employed for a short time in the Pennsylvania state highway department, and on December 4, 1922, entered the service of the Pennsylvania as a rodman in the office of the division engineer of the New York division at Jersey City, N. J., subsequently being transferred to the Baltimore division, and later to the Philadelphia division. Mr. Gingerich served as assistant supervisor of track on the New York, Baltimore, and Philadelphia divisions, and on July 7,

L. E. Gingerich

1928, he was promoted to supervisor of track, serving on the Williamsport, Philadelphia, and Baltimore divisions. In April, 1934, he received a special assignment on the rehabilitation of the Baltimore tunnels in connection with the Pennsylvania's electrification of its main line from Wilmington, Del., to Washington, D.C. In November, 1934, he was named assistant division engineer of the New York division at Jersey City, and on May 1, 1936, he became division engineer of the St. Louis division, subsequently being transferred to the Chicago Terminal division. On June 1, 1941, Mr. Gingerich was assigned to special duty

(Continued on page 636)

SMALL *POWERFUL HARD HITTING* COMPRESSOR

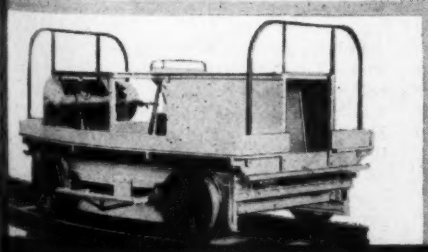
THIS small SCHRAMM 60 cu. ft. self-propelled crawler type compressor is a highly mobile and efficient unit particularly for spot tamping or for use by small bridge and building gangs. Its narrow width permits operation on the narrowest shoulder of the right of way. Since each track is independently driven by a forward and reverse clutch controlled by the operator its maneuverability is ideal for railway service. Larger self-propelled crawler type compressors can be furnished in 210 cu. ft. size.

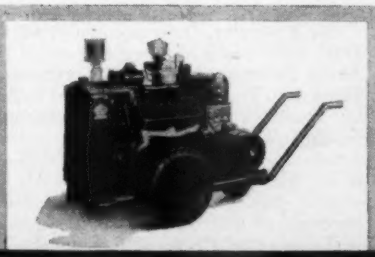
The SCHRAMM 60 cu. ft. off-track compressor is also furnished with two rubber-tired wheels and with conveniently placed handles to simplify its removal from flat car or trailer.

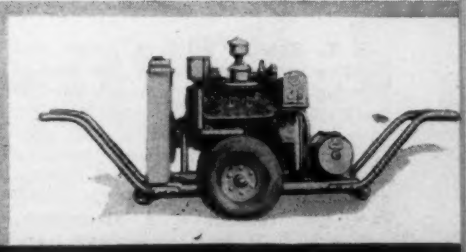
Gasoline and Diesel powered models mounted on light-weight rail cars for standard gauge track can be furnished either self-propelled from same engine that drives the compressor, or non-self for towing. These units range in size from 60 cu. ft. to 315 cu. ft.

All SCHRAMM models provide hard-hitting dependable, economical power—regardless of temperature. They have multi-cylinders, water jacketed for correct lubrication at all temperatures . . . Mechanical intake valve . . . Operate at most economical speed, using less fuel for air delivered . . . No auxiliaries to buy . . . Shipped ready for action.

Write for Bulletin RM-44







in the office of the chief engineer at Philadelphia, Pa., and on April 16, 1942, he became engineer maintenance of way of the Western Pennsylvania division at Pittsburgh. One year later he was named superintendent of the Delmarva division at Cape Charles, Va., a post which he held at the time of his present appointment as chief engineer maintenance of way of the Central region.

Track

John J. Cox, a track foreman on the New York Central, has been promoted to assistant supervisor of track of Subdivision 29 of the Eastern division, with headquarters at Brewster, N.Y., succeeding **William Carey,** who has retired.

Lewis Jacque, a track foreman on the Delaware, Lackawanna & Western, has been promoted to supervisor of track, with headquarters at Elmira, N.Y., to succeed **Leo McNamara,** transferred.

P. W. Scribner, general foreman on the Erie, with headquarters at Hornell, N.Y., has been promoted to supervisor of track, with headquarters at Dunmore, Pa., to succeed **J. T. Flynn,** who has been transferred to Campbell Hall, N.Y., to replace **H. S. Trenholm,** who has been transferred to Callicoon, N.Y. Mr. Trenholm succeeds **W. R. Worthington,** who has been released to enter military service.

Paul O. Hansen, whose promotion to supervisor of track on the Grand Rapids division of the Pennsylvania, with headquarters at Grand Rapids, Mich., was reported in the March issue of *Railway Engineering and Maintenance,* was born at Beresford, S.D., on February 6, 1914, and received his higher education at Iowa State College. He entered railway service with the Pennsylvania in April, 1937, as an assistant on the engineering corps at Columbus, Ohio, later serving in the same capacity at other points on the road. From April 1, 1938, to March 13, 1939, he was granted a furlough to work for the Portland Cement Association, with headquarters at Chicago, returning to the Pennsylvania in June, 1940, as an assistant on the engineering corps, with headquarters at Buffalo, N.Y. In the same year, Mr. Hansen was transferred to Pittsburgh, Pa. On February 16, 1941, he was promoted to assistant supervisor of track, with headquarters at York, Pa., and two months later he was transferred to Baltimore, Md., remaining in that location until his new appointment.

J. T. Roberts, assistant bridge and building supervisor on the Southern at Birmingham, Ala., has been promoted to track supervisor on the Mobile division, with headquarters at Selma, Ala., succeeding **S. T. Montgomery,** who has been transferred to the St. Louis-Louisville division, with headquarters at Lawrenceburg, Ky., replacing **A. A. Stonecipher,** deceased. **Q. W. Houchin,** assistant track supervisor at Picayune, Miss., has been advanced to track supervisor, with headquarters at Centralia, Ill., relieving **J. B. Hutcherson,** who has been transferred to Somerset, Ky.

Bridge and Building

W. K. Manning, general bridge foreman on the Erie, with headquarters at Cleveland, Ohio, has been promoted to supervisor of bridges.

D. D. Harnois has been appointed master carpenter of the Cedar Rapids division of the Chicago, Rock Island & Pacific, with headquarters at Cedar Rapids, Iowa.

Andrew Pfeiffer, bridge and building foreman on the Southern Pacific, with headquarters at Sacramento, Cal., has been promoted to assistant bridge and building supervisor, with headquarters at Oakland Pier, Cal.

James Walsh, assistant master carpenter on the Chicago, Burlington & Quincy, with headquarters at Beardstown, Ill., has been promoted to master carpenter, with the same headquarters.

Water Service

Robert M. Stimmel, chief chemist, water department, of the New York, Chicago and St. Louis (Nickel Plate), with headquarters at Lima, Ohio, has been promoted to superintendent of water service, with the same headquarters, a newly-created position. Mr. Stimmel was born at Garnett, Kan., on September 30, 1896, and graduated from the University of Kansas in 1920. He entered railway service on October 15, 1924, as an assistant chemist on the Chesapeake & Ohio, and two years later he went with the Hocking Valley (now part of the C. & O.), as a chemist. In January, 1930, he was promoted to chief chemist, water department, on the Chesapeake & Ohio, with headquarters at Huntington, W. Va., and in August, 1933, he became chief chemist, water department, on the Nickel Plate, with headquarters at Lima.

Special

Alfred G. Rose, scale and bridge inspector on the Missouri Pacific, with headquarters at Osawatomie, Kan., has been promoted to system scale inspector, with headquarters at St. Louis, Mo.

Obituary

Earl H. Mills, formerly general gas engine inspector of the New York Central, Lines East of Buffalo, died at his home at Mt. Vernon, N.Y., on June 25. Mr. Mills had retired somewhat more than a year ago because of ill health.

Lee T. Taylor, division engineer on the Gulf, Colorado & Santa Fe (part of the Santa Fe System), with headquarters at Galveston, Tex., died in a hospital in that city recently. Mr. Taylor was born at Springfield, Tenn., and entered railway service in 1913 as a rodman on the G. C. & S. F., later serving continuously in various capacities in the engineering department of that road, except for a brief period of service in the U. S. Army during the first World War, until February, 1936, when he was promoted to roadmaster at Brownwood, Tex. In July, 1941, Mr. Taylor was promoted to the position he held at the time of his death.

Association News

Metropolitan Maintenance of Way Club

The annual outing of the club was held on June 22, at the Houvenkopf Country Club, Suffern, N.Y., with 112 members and guests in attendance. The program included such sports as softball, horse shoes, quoits and golf, and prizes were awarded to winners in all activities. A buffet luncheon was served at noon.

American Railway Engineering Association

Seven standing committees held meetings in June, but none has thus far scheduled a meeting in July. The meetings in June were those of the Committee on Roadway and Ballast, in Chicago on June 6 and 7; the Committee on Buildings, in New York on June 7 and 8; the Committee on Economics of Railway Labor, in Chicago on June 13; the Committee on Water Service, Fire Protection and Sanitation, in Chicago on June 16; the Committee on Co-operative Relations With Universities, in Cincinnati, Ohio, on June 23; the Committee on Economics of Railway Location and Operation, in Pittsburgh, Pa., on June 28; and the Committee on Wood Bridges and Trestles, in Chicago on June 29.

Both the 1944 volume of the proceedings and the Annual Supplement to the Manual are now off the press, but are being held up by unusual delays in the bindery. It is hoped that it will be possible to distribute these volumes to members by the end of July.

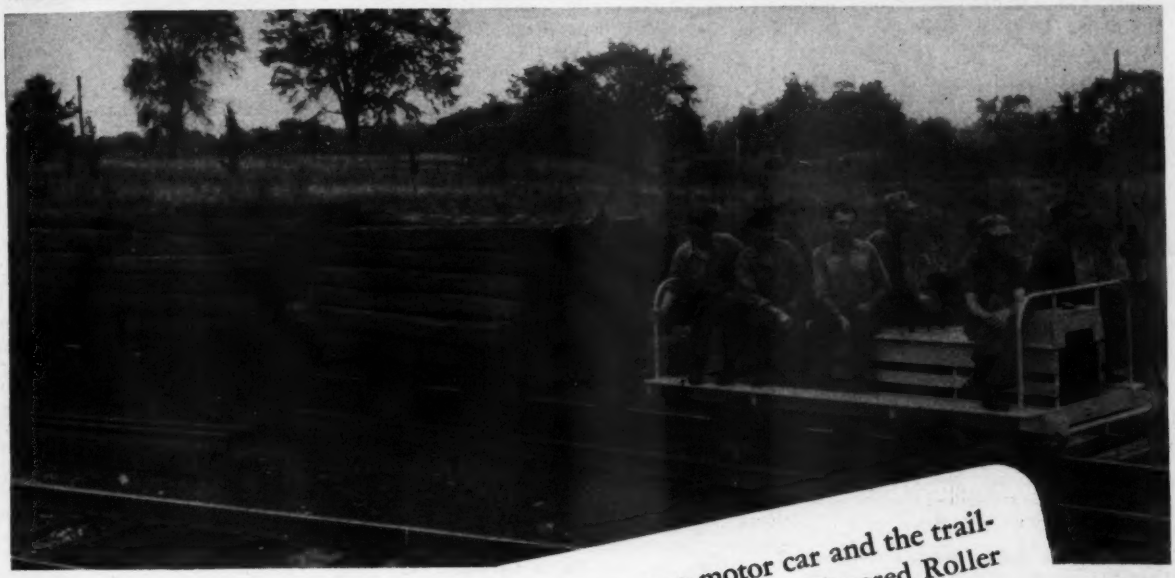
Roadmasters' Association

At the call of President E. L. Banion, the Executive committee, in company with the chairmen of several of the technical committees, met in Chicago on June 19 and reviewed preliminary drafts of all six of the committee reports that are being prepared for presentation at the annual meeting in Chicago in September. Delays in closing advertising for the 1943 Proceedings and in the printing plant are holding up the completion of this volume, but every effort is being made to get it into the hands of the members at the earliest possible date.

Folders Feature Worthington Compressors.—Two illustrated folders, printed in color, have been published by the Worthington Pump and Machinery Corporation, Harrison, N.J., featuring the company's line of Feather Valve air compressors. In addition to showing the units completely assembled, the various pictures, accompanied by explanatory text, show close-ups of different parts, such as pistons and piston rods, crossheads, controls, motors, cylinders, frames, connecting rods and intercoolers. The compressors featured in the folders are the models YC, VA-2, VS and VA.

(Continued on page 638)

off to the job on TIMKEN BEARINGS



All axles of this Kalamazoo gang motor car and the trailers it is hauling are mounted on Timken Tapered Roller Bearings to help provide the speed; dependability; and endurance modern track maintenance equipment must have.

The performance that has made Timken Bearings supreme in modern streamlined trains and locomotives is the kind of performance you need in your new section cars; specify "Timken Bearing Equipped" and be sure of getting it.

Furthermore, you'll have less wheel breakage; no lubrication trouble; and greatly reduced upkeep cost. Timken Bearing Equipped cars you buy today will serve you efficiently for years to come. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS

Supply Trade News

General

The American Rolling Mill Company has purchased the assets of the **Ohio Corrugated Culvert Company,** Middletown, Ohio, and the **Shelt Company,** Elmira, N.Y. It is reported that both companies will be operated by a wholly-owned Armco subsidiary, **Armco Drainage and Metal Products, Inc.**

A Moore reversible cross circulation type lumber dry kiln, which will take a maximum charge of 50,000 board feet, is being installed at the Carbondale, Ill., plant of the **Koppers Company, Wood Preserving Division,** and should be in operation about the middle of July.

Employees of **Skilsaw, Inc.,** Chicago, manufacturers of portable electric tools, have received for the third time the Army-Navy Production Award for high Achievement in the production of war materials. This third citation, received on June 10 from Under Secretary of War Robert P. Patterson, adds a second white star to the company's "E" flag as a symbol of continued contribution to the war effort.

The Worthington Pump & Machinery Corporation has purchased the **Electric Machinery Manufacturing Company** of Minneapolis, Minn. The Electric Machinery Company's major lines include synchronous motors for direct drive for power plant and industrial machinery and electric generators for steam and internal combustion engines. The company will continue to operate independently of the other Worthington activities.

The Timken Roller Bearing Company, Canton, Ohio, has organized a subsidiary, **The Timken Roller Bearing Company of South America,** to service Timken bearings in South America after the war, and to anticipate a postwar acceleration of industrial growth there. This firm, under the direction of Jules A. Morland, former New York representative, will handle engineering development of Timken products in the Latin-American countries and as part of its organization program, now has two young Brazilian engineers, Murillo Garcia Moreira, of Rio de Janeiro, and Jose Marianno Chaves, of Sao Paulo, in its Canton and Mt. Vernon plants, where they are familiarizing themselves with the engineering production and application of Timken products. These engineers began their work in the Canton plant early in February and expect to remain for a year and a half, after which they will return to South America as field engineers and general representatives of the company.

Personal

The **Union Carbide & Carbon Corporation** has announced the election of seven presidents of subsidiary companies. **Dr. Joseph G. Davidson** has been elected president of the **Carbide & Carbon Chemicals Corporation,** and **Carbide & Carbon Chemicals, Ltd.** Dr. Davidson was graduated from the University of Southern California and Columbia University. He participated in the early work in synthetic organic chemistry which led to the foundation of the Carbide & Carbon Chemicals Corporation, and has served in the company since its formation. During the last twelve years he has been vice-president in charge of sales.

Dr. Lawrence W. Bass, director of the New England Industrial Research Foundation, has been appointed associate director of research of the **Air Reduction Company** and the **United States Industrial Chemicals Company.**

Robert J. Ritchey has been appointed manager of the market development division of the sales department, formerly known as the sales promotion bureau, of the **Carnegie-Illinois Steel Corporation.** Mr. Ritchey joined Carnegie-Illinois in 1937 as assistant in sales promotion. He was appointed assistant manager of sales promotion in 1941, and has been acting as manager of the present market development division since December, 1941, up to the time of his new appointment.

Stanley B. Kirk has been elected president of the **Linde Air Products Company,** the **Prest-O-Lite Company,** the **Dominion Oxygen Company, Ltd.,** and the **Prest-O-Lite Company of Canada.** Mr. Kirk was graduated from the University of Wisconsin in 1913 and joined the Union Carbide Sales Company in 1915. Since that time he has been responsible for sales and sales management in the gas group of companies of the corporation.

Francis P. Gormely has been elected president of the **Electro Metallurgical Company,** the **Electro Metallurgical Company of Canada,** the **Haynes Stellite Company,** the **Michigan Northern Power Company,** and the **Union Carbide Company of Canada.** Mr. Gormely was graduated from Michigan University in 1909. He immediately joined the Union Carbide Company at Sault Ste. Marie, Mich., as an electrician, and has served continuously in various production and executive capacities since that time.

John D. Swain has been elected president of the **Electro Metallurgical Sales Corporation.** Mr. Swain was graduated from DePauw University in 1912 and joined the Union Carbide Sales Company at Chicago in 1915. He served in the Army Air corps during the first world war, resuming his sales work when the war ended. He has served since in sales executive and administrative capacities since that time.

John R. Van Fleet has been elected president of the **United States Vanadium Corporation.** He has been identified with the natural resource supplies of the corporation for many years. Mr. Van Fleet is also president of the Union Mines Development Corporation.

Obituary

David T. Hallberg, assistant to the president of the P. & M. Company, Chicago, whose death on May 27 was reported in the June issue of *Railway Engineering and Maintenance,* was born in Ottumwa, Iowa, on September 11, 1885, and after completing a public school education in that city, entered the printing business in Chicago. Leaving this employment in 1905, he entered the passenger and advertising department of the Atchison, Topeka & Santa Fe and later was appointed Western representative of the Santa Fe employees magazine. He held that position until 1910 when he entered the service of the P. & M. Company as a material inspector. Shortly thereafter, he became Western representative of the company and in January, 1918, he was appointed sales representative at Chicago. In June, 1918, he was promoted to district sales agent and on January 1, 1922, to assistant general sales agent. Shortly thereafter, he was promoted to general sales manager and on May 1, 1931, to assistant to the president, which position he was holding at the time of his death.

David T. Hallberg

Trade Publications

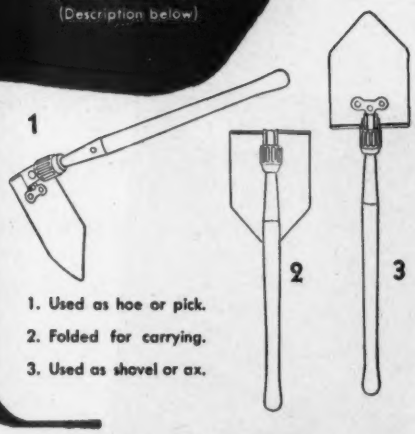
Duff-Norton Jack Catalog.—Listed as No. 212, a new, 28-page catalog has been published by the Duff-Norton Manufacturing Company, Pittsburgh, Pa., covering its line of jacks for all jobs of lifting, lowering, pushing and pulling. In addition to descriptions and specifications, the catalog includes a number of application photographs.

Brochure Features Thor Plastic-Housed Drills.—The Independent Pneumatic Tool Company, Chicago, has published a 16-page brochure which covers the history, development, features and specifications of the recently-introduced Thor plastic-housed portable electric drill. The booklet, which was prepared for the purpose of presenting specific facts concerning the advantages of the new drill and its application of plastic as a strong and reliable housing, is a colorful and interesting exposition of the increasing use of plastics for many industrial purposes. Making efficient use of pictures and text and printed in color on high grade paper, the brochure is attractive and modern in appearance. It is entitled Tools to Build the World Tomorrow, Born From the Need of Today.

WAR BONDS BUY SHOVELS TOO!

IN WORLD WAR I
. . . of the entire 1,800,000 Entrenching Shovels made for the U. S. Armed Forces, WOOD alone made 1,250,000.

In World War II, WOOD has already made hundreds of thousands of the new 1943 Entrenching Shovels as shown. (Description below)



1. Used as hoe or pick.
2. Folded for carrying.
3. Used as shovel or ax.

WAR WON'T WAIT! Urgent war demands have required us to vastly increase our output . . . We've already produced immense quantities of both regular style and Entrenching Shovels for the Armed Forces . . . This is why we have been able to supply only a bare minimum for home-front use—in spite of our sympathetic realization of the needs of our trade . . . But after the war, all our famous brands will be back—in unlimited quantities—in *finer-than-ever quality* developed in our intensive war production.

★ ★ ★ ★ ★

BUY WAR BONDS
and Back the Attack!

FIGHT INFLATION
and Safeguard the Home Front!

SAVE SCRAP METAL
and Keep War Production Rolling!

★ ★ ★ ★ ★

The WOOD SHOVEL AND TOOL COMPANY

PIQUA, OHIO

A NATIONAL ORGANIZATION SPECIALIZING IN SHOVELS, SPADES AND SCOOPS

Bill Asks for Help . . .

. . . and Gets it thru the Advertising Pages of Railway Engineering and Maintenance

"Put on the Spot"

"Boss, I was put on the spot plenty last night," said the star salesman to his railway sales manager.

"How's that, Bill?" inquired the sales manager.

"I met Bob ——, chief engineer of the V-Y railway on the train and in the course of our conversation I told him about the equipment we built for Charley ——, of the R-S road."

"That ought to interest him."

"I'll say it did. He jumped down my throat for not telling *him* about this unit. Said it was just what *he* needed, too."

"What did you say?"

"I told him that I had called on him three or four weeks ago but found that he was out on the line and I hadn't been able to get back since."

"What did he say to that?"

"He asked me why we didn't advertise it in *Railway Engineering and Maintenance.* Said he'd get it in that magazine for it always gets to him, whether he's in the office or out on the line, and he always reads the advertising, looking for new ideas."

"Guess that's a bet we overlooked, Bill."

"That's what I concluded. That's why I'm telling you now."

"We'll correct *that* omission right away. We'll have our story of this equipment in the next issue, Bill."

"Thanks, Boss. It'll multiply my sales several times, especially in these days."

RAILWAY ENGINEERING AND MAINTENANCE IS READ BY MAINTENANCE OFFICERS OF ALL RANKS

BOOKS THAT HELP MAINTENANCE MEN

Roadway and Track

By W. F. RENCH

This book describes standard methods of roadbed and track maintenance. It shows, for instance, how to plan maintenance work systematically and suggests a balanced program for the entire year. It is written out of a background of twenty-five years' experience and, although the practice described is largely that of the *Pennsylvania*, it embodies standard methods on other roads.

Experienced track formen, supervisors, roadmasters and engineers will find in Mr. Rench's book many helpful ideas on how to obtain better results. Younger men will find in it both information and instruction on how to solve the maintenance man's problems. Track men wishing the learn more about their work and place themselves in line for promotion, will find it a practical guide.

CONTENTS

Part I. Roadway. The Essential Elements in Roadway Maintenance—The Right of Way—Drainage of Roadbed and Track—Vegetation for Banks—Labor Saving Devices and Methods in Roadway Work—Economics of Roadway—Tools and Their Uses.

Part II. Track. The Essential Elements in Maintenance of Track—A program for M. W. & S. Work—The Track Obstruction—Labor Saving Devices and Methods in Track Work—Track Materials and Their Use—Practice in Rail Renewals—Maintenance of Main Tracks—Maintenance of Yards and Terminals—Maintenance Problems and Methods Used—Economics of Track Labor—Special Duties in the M. W. Department.

Second edition. 266 pages, 44 illustrations, 6 x 9 inches, cloth. $2.00.

Simplified Curve and Switch Work

By W. F. RENCH

The little book has practically revolutionized curve and switch calculation practice since its appearance 15 years ago. The proved accuracy of its methods has caused them to be adopted as standard practice on many roads.

Complex algebraic and geometric calculations are reduced to their simplest form and as nearly as possible to terms of simple arithmetic. The application of these calculations to the actual job is made plain by brief explanations. Drawings further clarify the subject and make the meaning of the text unmistakable. Tables of dimensions are a further help to the track foreman.

Short cut formulae are featured. String lining and tape line layout are fully explained. While retaining practically all of the rules and principles which have been tested in previous editions, changes have been made in several detailed features to correspond to improved designs. A flexible binding makes it convenient to slip in the pocket and carry on the job.

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30 Church St., New York 7,

Please send me for 10 days' free examination the books checked below. I will either remit list price or return the books within that time.

☐ Simplified Curve and Switch Work ☐ Roadway and Track

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Address .....

City ..... State.....

Position..... Company..... RH&M 7-44

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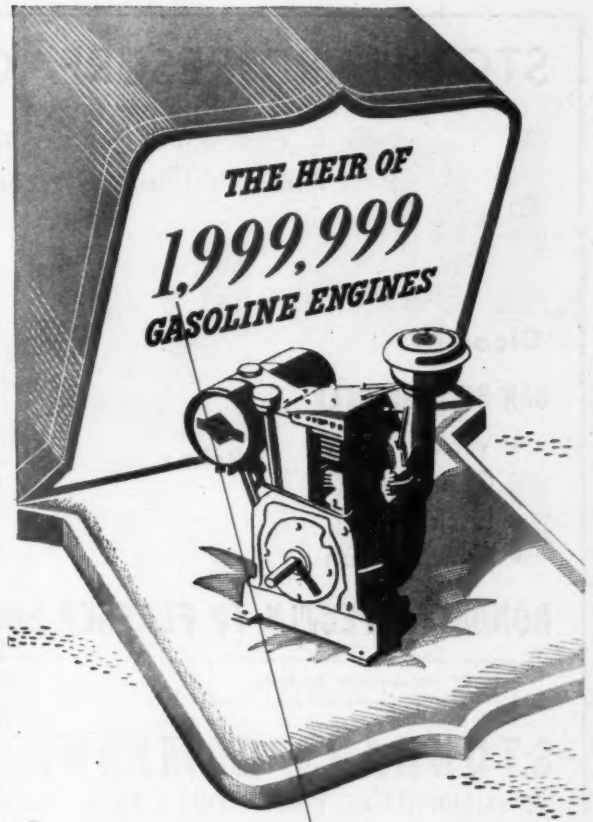

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the TWO MILLIONTH
Briggs & Stratton engine
moved off our production lines.
We are now well started
on the THIRD MILLION.

Air-Cooled Power BRIGGS & STRATTON 4 CYCLE GASOLINE ENGINES

We of Briggs & Stratton are proud of the endorsement of manufacturers, dealers and owners — and proud to be recognized as leaders in design, engineering and research, as well as precision production — the results of *twenty-five years* of continuous production of air-cooled gasoline engines. Briggs & Stratton Corp., Milwaukee 1, Wis., U.S.A.

STONHARD RESURFACER IS THE ANSWER!—

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If You Want Repairs to Ruts and Holes in Platforms & Floor Areas That Can Be Accomplished Under Wartime Requirements of

★ A JOB DONE OVERNIGHT!
★ WITH A MINIMUM OF MANPOWER!

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CAN BE USED OVER

- Wood
- Concrete
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Actually, Any Handyman Can Do The Job!

Apply

BONDS PERFECTLY TO FEATHER-EDGE

.30 Maintenance Products.

100,000 Satisfied Customers.

STONHARD COMPANY Established in 1922

1323 CALLOWHILL ST., PHILADELPHIA 8, PA. • *Sales Offices and Stocks in Principal Cities*

When Labor is Scarce

Use the **JORDAN**

COMPOSITE SPREADER-DITCHER

"It does the work of an army of men"

Cleaning ditches — leveling embankments — shaping slopes—dressing ballast, etc.

STANDARD EQUIPMENT FOR A GENERATION

O. F. JORDAN COMPANY EAST CHICAGO INDIANA

Walter J. Riley, *President*

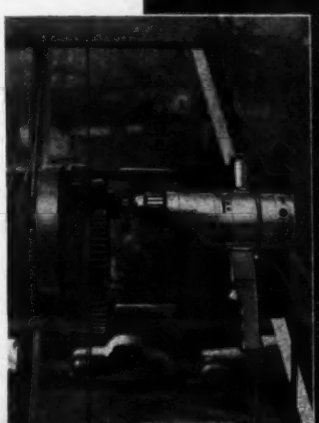
THE POWER OF THIS

SKILSAW DRILL *lifted* HALF-A-TON!

● Chances are you'll never use Model "123" SKILSAW DRILL to operate a Beebe hoist—but the Sound Construction and Engineering Co. of Seattle did—and Model "123" lifted half ton loads regularly, without a quiver!

This is just another example of the surplus power packed inside the compact body of Model "123"—power you can use to good advantage drilling holes up to ¾ inch in steel, 2 inches in wood.

Find out today how this rugged heavy duty SKILSAW DRILL can save time, money and manpower for you on all heavy drilling. Ask your distributor for a demonstration *now!*



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Sales and Service Branches
in All Principal Cities

SKILSAW PORTABLE ELECTRIC TOOLS
MAKE AMERICA'S HANDS MORE PRODUCTIVE

Do It ALL With

BURRO

Here are some of the jobs Burro Cranes are doing for railroads:

Handling rails and ties in laying track
Handling rails and ties in dismantling track
Unloading and loading from car to truck
Picking up track-fastenings with magnet
On a flat car in a work-train
Digging drainage ditches
Handling car parts
Cleaning cinder pits
Relaying track
Refueling engines
Spreading ballast
Loading scrap
Driving piles
Hauling
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—and they do it all fast—easily—economically. Burro Cranes are versatile, adaptable, easy to handle—designed and built for railroad use.

Write for Bulletins F-100 and F-112

CULLEN-FRIESTEDT CO.

1301 S. Kilbourn Ave., CHICAGO 23, ILL.

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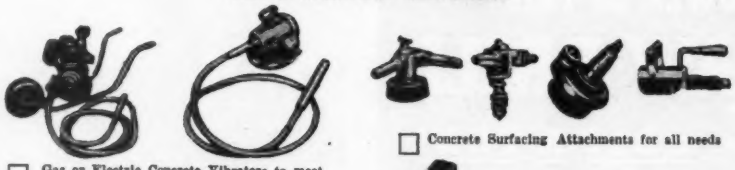
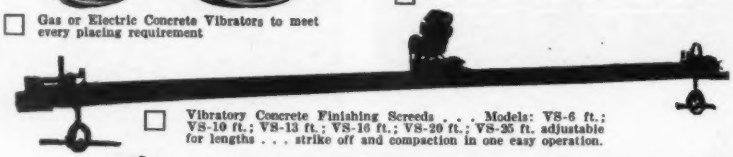
Send for literature on items checked



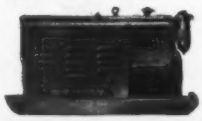
☐ Concrete Surfacing Attachments for all needs

☐ Gas or Electric Concrete Vibrators to meet every placing requirement



☐ Vibratory Concrete Finishing Screeds . . . Models: VS-6 ft.; VS-10 ft.; VS-13 ft.; VS-16 ft.; VS-20 ft.; VS-25 ft. adjustable for lengths . . . strike off and compaction in one easy operation.

☐ Portable AC or DC Gas Electric Generator Sets to meet all power, lighting requirements. ½ to 17 KW. Open or housed models.



SPEED YOUR WORK
SAVE MANPOWER
with Master Equipment
"PREFERRED THE WORLD OVER"

Power, portability, simplicity and built-in dependability distinguish all Master Vibrator Company equipment . . . make it the choice of thousands of engineers and contractors wherever work must be done fast, efficiently and at lowest operating and manpower cost. *Immediate delivery.*

Write for literature at once!

☐ Full line of Flood and Shovel Lights (not illustrated).

☐ Electric "Power Blow" Hammer and Tools for heavy or light duty work. Model 650 Generator Plant to operate hammer when electricity not available.

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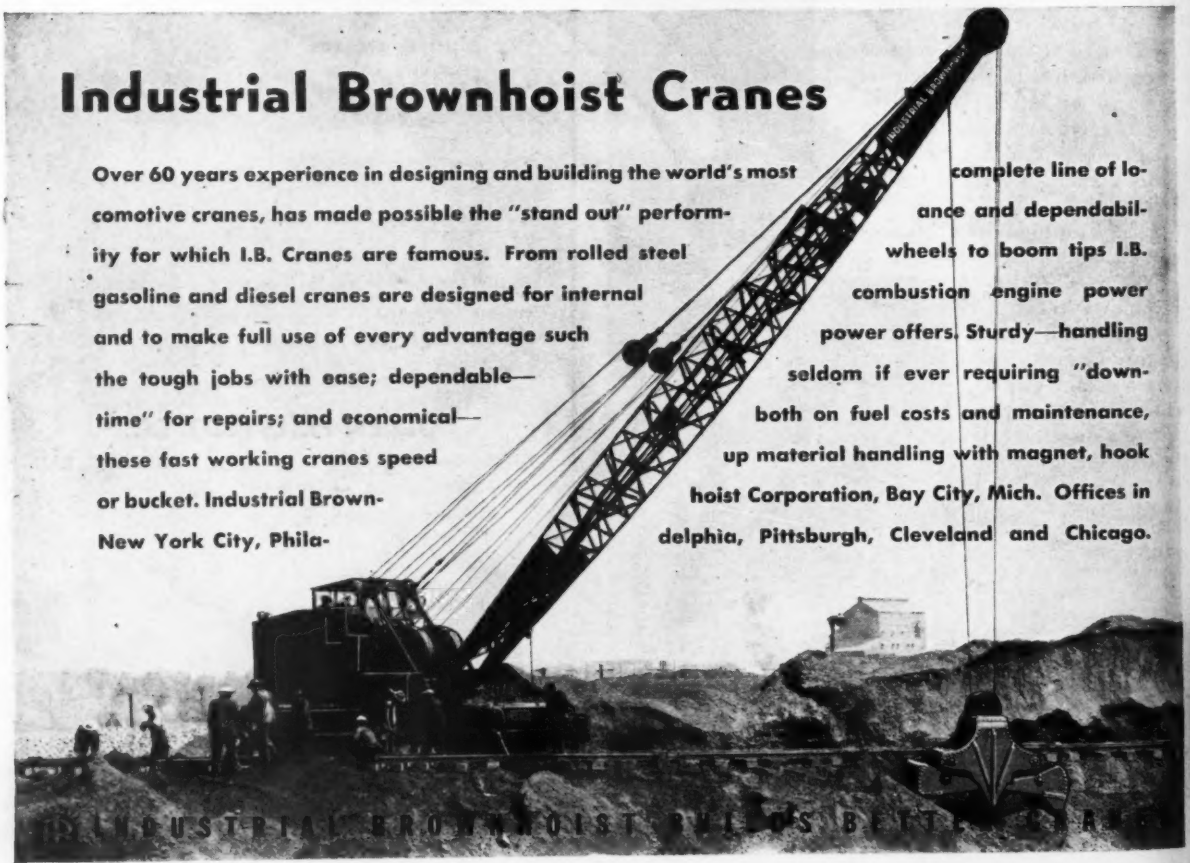
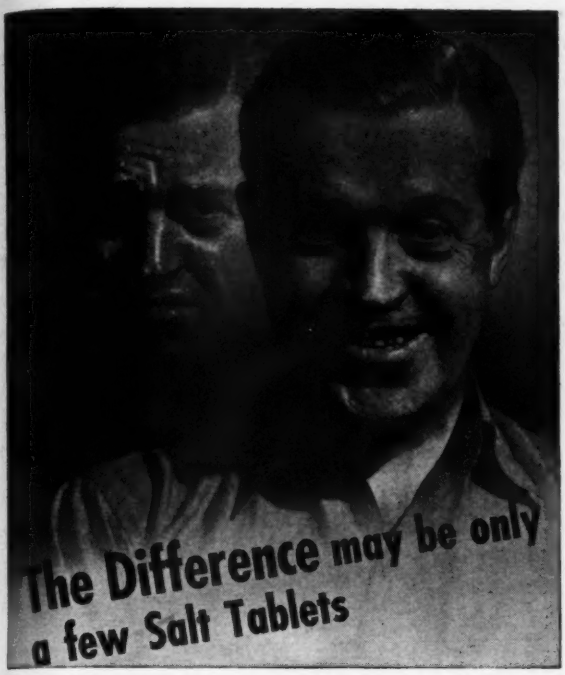
Over 60 years experience in designing and building the world's most complete line of locomotive cranes, has made possible the "stand out" performance and dependability for which I.B. Cranes are famous. From rolled steel wheels to boom tips I.B. gasoline and diesel cranes are designed for internal combustion engine power and to make full use of every advantage such power offers. Sturdy—handling the tough jobs with ease; dependable—seldom if ever requiring "down-time" for repairs; and economical—both on fuel costs and maintenance, these fast working cranes speed up material handling with magnet, hook or bucket. Industrial Brownhoist Corporation, Bay City, Mich. Offices in New York City, Philadelphia, Pittsburgh, Cleveland and Chicago.





. . . and they cost less than 1 cent a man per week

Salt is vital to proper body tone. Loss of salt through sweat can easily transform an eager, alert, comfortable worker into one who is fatigued, miserable, careless.

Loss of salt dehydrates the body, thickens the blood, destroys the equilibrium of body fluids. The results are Heat-Fag, inalertness, accidents, heat prostrations.

The preventive is salt and water — water to restore the moisture lost in sweat, salt to restore the saline balance. Water alone won't do it. Under hot, "sweaty" conditions water alone dilutes the blood and causes heat cramps.

Industrial physicians with America's greatest manufacturing plants have found that the easy, simple, economical way to provide essential salt is Morton's Salt Tablets at every drinking fountain. A tablet with every drink of water is all that's necessary to prevent Heat-Fag, heat cramps, heat prostrations—to keep workers alert, at peak production.

This Is What Happens When Sweating Robs the Body of Salt . . .

QUICK DISSOLVING
(Less than 30 Seconds)

This is how a Morton's Salt Tablet looks when magnified. See how soft and porous it is inside. When swallowed with a drink of water, it dissolves in less than 30 seconds.

Case of 9000, 10-grain salt tablets - - - - - $2.60

Salt-Dextrose tablets, case of 9000 - - - - - $3.15

MORTON'S Heat-Fag SALT TABLETS

Morton's Dispensers

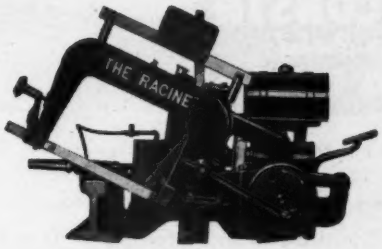
They deliver salt tablets, one at a time, quickly, cleanly—no waste. Sanitary, easily filled, durable.

800 Tablet size - - - $3.25

Order from your distributor or directly from this advertisement . . . Write for free folder.

MORTON SALT COMPANY, Chicago 4, Illinois

Speed Up Rail Cropping



with RACINE high speed portable RAIL CUTTERS

Heavy traffic, plus labor and material shortages, have increased maintenance of way problems. Rail cropping with RACINE Portable Rail Cutters saves man hours and material. Hundreds of these machines are now at work on leading roads, cropping rail ends, fast, clean and accurately.

These candid photos show how rail cropping can be done on a production basis with the use of Racine Rail Cutters.

The portability of these saws makes them highly desirable and advantageous to use anywhere, whether it be "on the track," in yards, warehouses or shops. Models are available with either gas engine, electric or compressed air motor power equipment.

TIME AND LABOR SAVING FEATURES

Two men can easily carry a Racine Rail Cutter.

When clamped to rail and started, saw needs no further attention until cut is completed.

Cut can be made to within 3/10" from rail end.

Low blade cost — low operating cost.

Accurate cutting — no damage to grain structure from heat or break.

Write for Racine Rail Cutting Saw Circular No. 58A. Address Dept. RE-S. Also investigate Racine's complete line of metal cutting machines for high speed production cutting and general shop work. Request Catalog No. 12.

RACINE

RACINE

TOOL and MACHINE COMPANY

Standard for Quality and Precision

RACINE, WISCONSIN, U. S. A.

BALANCED RODS

Another
PLUS FEATURE
IN ALL
WISCONSIN
Air-Cooled
ENGINES

Every connecting rod, in every Wisconsin Air-Cooled Engine, is precision-balanced to eliminate all weight variations in excess of ¼-ounce per rod.

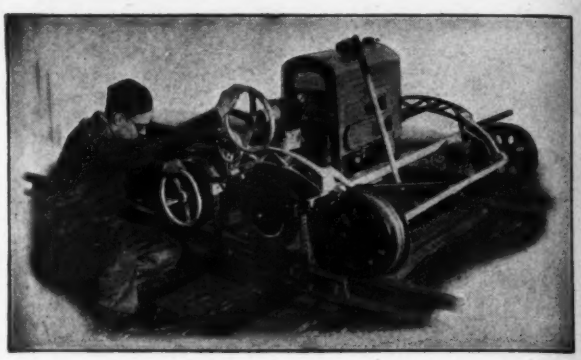
This is admittedly cutting it pretty fine for a rough-and-ready heavy-duty engine . . . but not *too* fine for these fine engines. Smooth operation, reduction of vibration to a negligible minimum, prevention of excessive wear . . . these are factors that can be controlled only by the most meticulous care and attention to such small details as this in building an engine.

The *value* of this attention comes into play when a Wisconsin Air-Cooled Engine powers your equipment.

Most H.P. per pound
WISCONSIN MOTOR
Corporation
MILWAUKEE 14, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

TO MAINTAIN SERVICE MAINTAIN RAIL

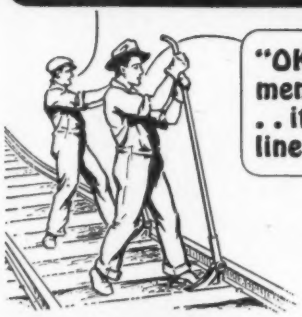
You can't maintain war-time service indefinitely without keeping up peace-time rail maintenance standards or better. As rail maintenance equipment and manpower conserver, Railway Track-work Grinders are enlisted on leading railways throughout the Nation. Keep yours busy. For information on the many models available, write for latest data bulletins.



Railway Track-work Model P-6 Track Grinder—one of many models.

Railway Track-work Co.
3132-48 East Thompson St., Philadelphia

"Let's get this STRAIGHT"



"OK . . there's no argument on the BLOXHAM . . it's the easiest way to line 'em up!"

BLOXHAM . . Track Liner of America's Railroads

. . . requires no lifting, no stooping, no "heeling up." Helps your section crews . . . cuts your maintenance costs.

Write for details and prices

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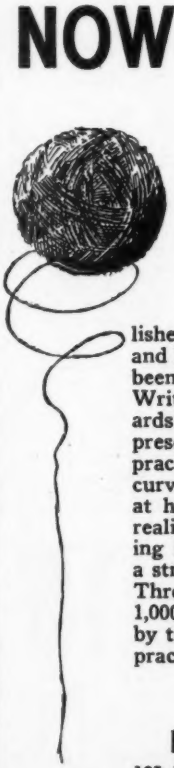

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By CHARLES H. BARTLETT

To meet the continuing demands for this booklet, reprinting a series of articles published originally in Railway Engineering and Maintenance, a fourth edition has just been printed and is now available.

Written to meet today's exacting standards for curve maintenance, this booklet presents in detail a method of proven practicability for checking and correcting curve alinement readily with tools that are at hand. It makes possible the accurate realinement of curves without engineering instruments or other appliances than a string and a rule.

Three editions of this booklet, each of 1,000 copies, have already been purchased by track men. Send for your copy of this practical aid for track maintenance.

Fifty Cents a Copy

Railway Engineering and Maintenance
105 W. ADAMS STREET, CHICAGO 3, ILL.

Keep Tracks Traffic-worthy

with Mall Portable Power Tools

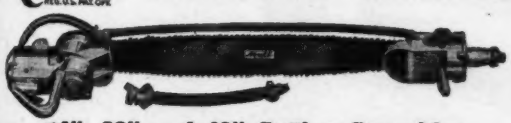
6 H.P. OFF-THE-TRACK PORTABLE POWER UNIT

Rail, Switchpoint, Frog and Crossing Grinding can be handled faster, better and at lower cost with this readily portable, 6 H.P. MALL gasoline-powered unit. It can be operated anywhere on the right-of-way without a generator or compressor set. It is easy to start in all temperatures . . . runs by itself . . . requires very little fuel . . . and is easily wheeled by one man. It is ruggedly constructed for long continuous service. Patented slip lock detail on ends of flexible shaft provides for quick easy change of grinding attachments. A big time and labor saver that will speed up maintenance now.

Mall 12" PNEUMATIC CIRCULAR SAW

A readily portable tool for heavy plank and timber sawing and grooving. It has a cutting capacity of 4½" on straight cuts in lumber. Easily adjusted for bevel cuts up to 45 degrees. Has powerful air motor, telescopic safety guard, and observation glass for clear vision on cutting line. Exhaust air keeps cutting line clear.

Mall PNEUMATIC CHAIN SAW



24", 36" and 48" Cutting Capacities

A powerful, high speed saw for cutting heavy timbers and piling for bridge, trestle, dock and other construction. Cuts off piling above or below water with equal facility. Unit is compact, light in weight, and readily portable. Cutting chain can be easily and quickly sharpened right on the job.

Write for literature and prices to Railroad Department

MALL TOOL COMPANY
7746 SOUTH CHICAGO AVE. CHICAGO 19, ILLINOIS

ON THE

"SWING SHIFT"

And Around the Clock . . .

Time means nothing to a finely engineered, sturdily built and properly installed Layne Well Water System. Throughout the twenty-four hours of each day it must be in perfect, and thoroughly dependable, working order. A sudden water failure could bring disaster.

Layne Well Water Systems — thanks to more than sixty years of world-wide experience — are as near failure proof as human skill, manufacturing honesty and quality materials can make mechanical equipment. Even the metals used in contact with the water are varied to assure longer life where corrosive conditions are encountered.

In addition to sturdiness in build and quality of materials used, Layne Well Water Systems and Layne Vertical Turbine Pumps are famous for their high efficiency. Such efficiency effects substantial savings each year.

To get all that you expect and must have in a dependable and long lasting water system, and to eliminate worry of failure, always choose a Layne Well Water System. Fully illustrated literature may be obtained by addressing Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

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WELL WATER SYSTEMS

DEEP WELL PUMPS

BUILDERS OF WELL WATER SYSTEMS FOR EVERY INDUSTRIAL AND MUNICIPAL NEED

HELPFUL INFORMATION

for men who Buy PUMPS

For handling all grades of fuel and lube oils.

A bulletin of diagrams and illustrations, showing why the "Bucket Design" (swinging vane) principle has been preferred for these services for over 40 years.

SEND FOR YOUR COPY NOW

POWER PUMPS—1 to 750 GPM. Pressures to 300 psi.
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EZY-KLEEN STRAINERS—Capacities up to 750 GPM.

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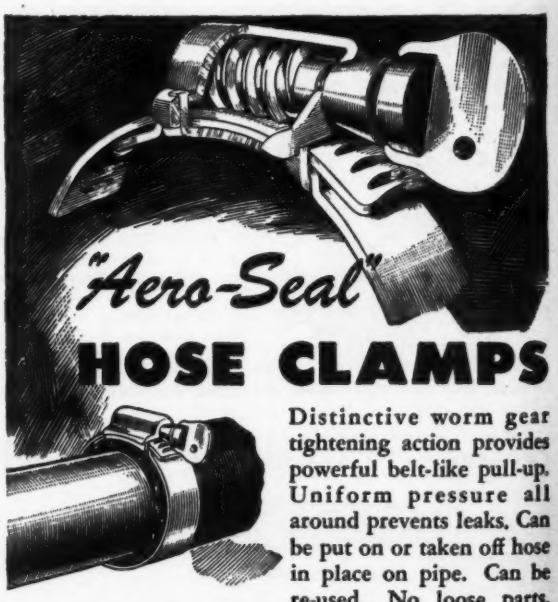

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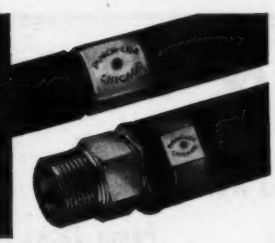

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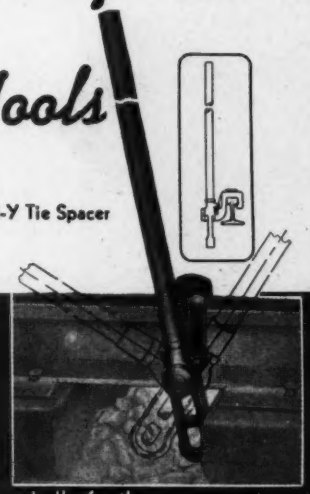

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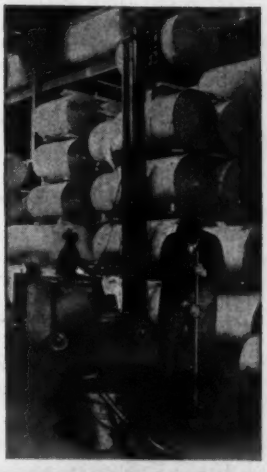

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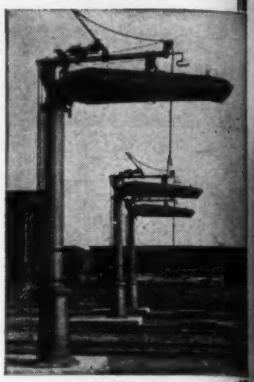

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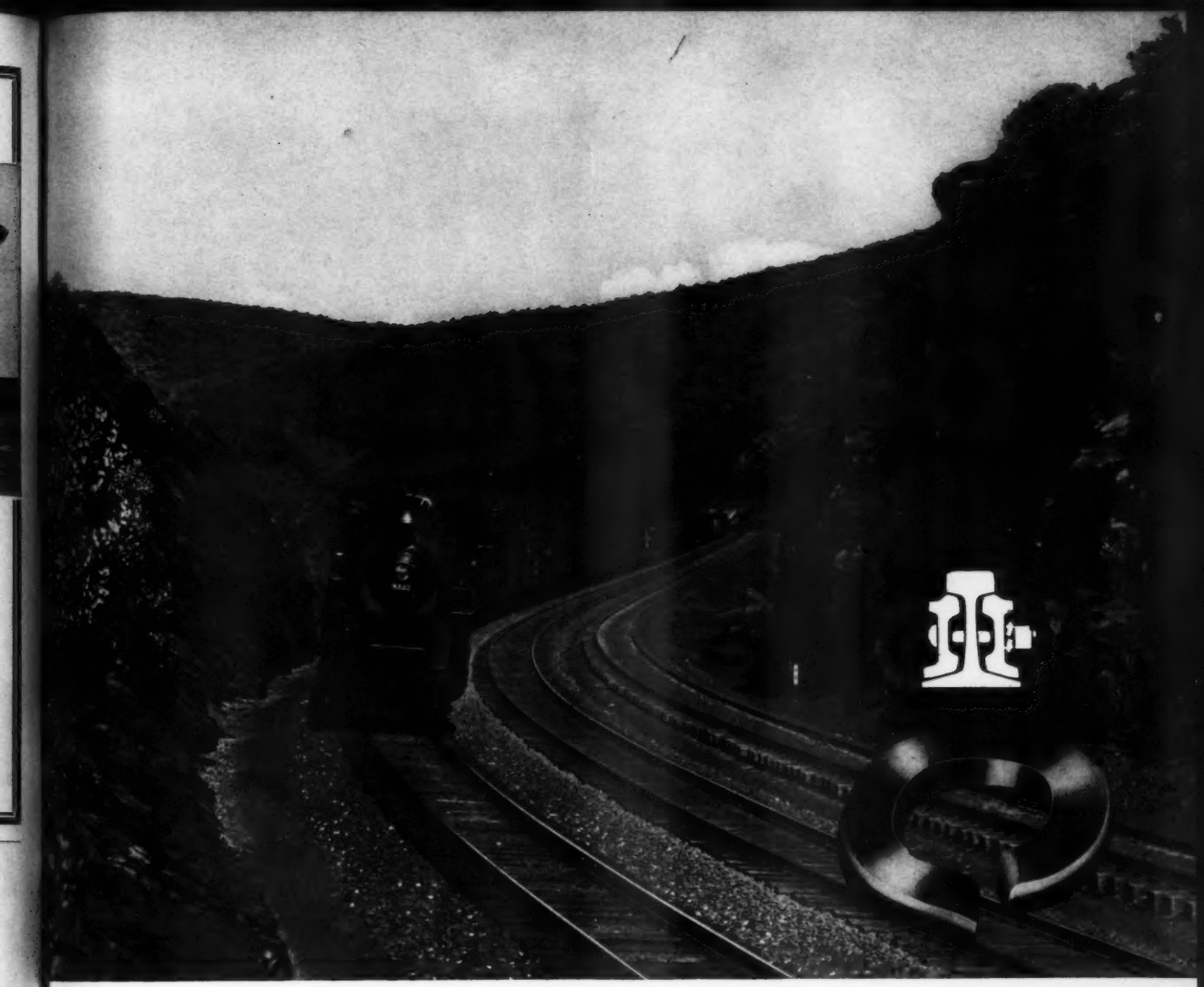

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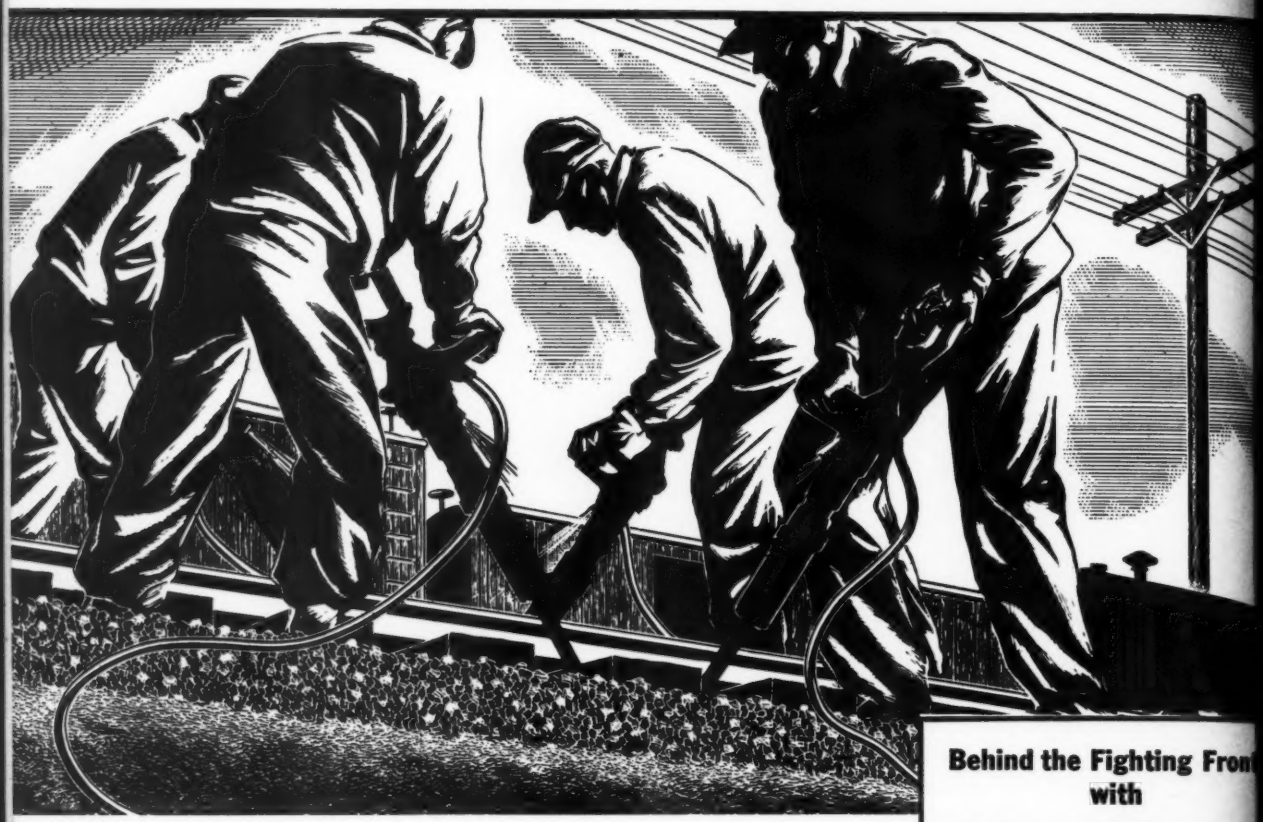

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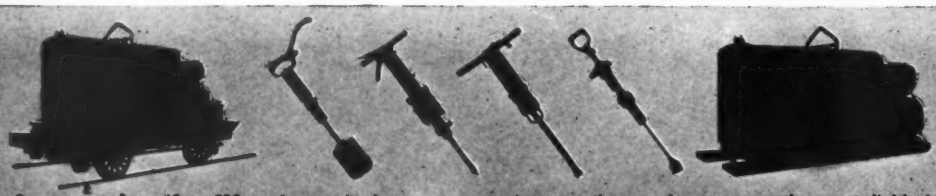

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